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Vol. VI. NEW YORK, AUGUST 15, 1885. No. 7.

WE may remind our readers of the meeting of the National Electric Light Association on the 18th inst., at the Union Square Hotel in this city. It is expected that the attendance will be large, and with so many topics worthy of discussion there ought to be no difficulty in making the occasion one of great benefit to all concerned.

MENTION is made elsewhere in our columns of the steps taken to reorganize the shattered Bankers & Merchants' Telegraph Company and to bestow a new name on it. The Western Union Company must be enjoying a forcible realization of the truth of that old, hackneyed saying about the many slips 'twixt cup and lip.

SHOULD any of our readers suffer from hay fever, it will please them to learn from an article appearing in another part of this issue, that if the nasal mucous membrane be touched with the galvano-cautery, the treatment will, by destroying the nerve fibres, give great and permanent relief, while the sense of smell is not impaired.

THE telegraph is now so thoroughly widespread and so familiar to every one, that few stop to think that it is but a thing of yesterday. And we must needs have our "Old Timers," too. It may furnish a nice, reflective cud for some of our Old Timers to chew on if we note that when Professor Morse took out his first patent for the telegraph Sir Moses Montefiore, who died in London last week, was fifty-three years old.

OWING to the shortness of the interval between the death of General Grant and his burial, a great quantity of work in connection with the arrangements for the magnificent demonstration of Saturday last was thrown upon the telegraph, and, incidentally, upon the telephone. This extra business was handled with the utmost dispatch and accuracy, and the skill of the operators has elicited some very pleasant compliments. The quantity of press matter handled during the time was also very large. Special demands were made, too, for electric lights, and the service rendered was very satisfactory, especially that at the City Hall here.

ALL the arrangements are now complete for the meeting at the Murray Hill Hotel of the Old Timers and the Military Telegraphers, according to the programme we have already published. Each organization will hold its business meeting on Wednesday, and the joint banquet will take place that night. On Thursday the wind-up meetings will be held, to be followed by an excursion down the bay. Everything promises a most enjoyable and memorable reunion. We have reason to believe that the attendance will be large. The offices of THE ELECTRICAL WORLD and *The Operator* will be open to our friends as down-town headquarters, and we shall be glad to see as many of them here as possible.

THE dinner given at the "Star and Garter," London, by Cyrus Field, on the occasion of the twenty-seventh anniversary of the opening of the first Atlantic cable (Aug. 5), was a brilliant affair, and well worthy of the great event which it commemorated. Since 1858 other men have laid down cables—a dozen separate ones now connect Europe and North and South America—but the chief honors belong to Cyrus Field. The signal failure of that first attempt, the subsequent efforts to lay another, the breakings and grapplings and fluctuating hopes, all crowned by triumph, point to him as the central figure. All honor to Cyrus Field!

IT is seldom that we hear of an organized "meeting" where the delegates sit in various cities from Boston to San Francisco, and exchange views and adopt resolutions by telegraph. Yet this was the appropriate way in which our military telegraphers "met" to condole with the family of their gallant, heroic old commander, General Grant. The military operators had a number of similar telegraphic meetings a quarter of a century ago, when General Grant was wont to preside. The results of these meetings had much to do with the destiny of the Union, and it is highly poetical that final leave should be taken of the great captain in that way.

THE Pittsburgh papers describe the manner in which Mr. Jackson, a roller in one of the local iron-works, has fitted up his modest dwelling with electric bells, electric gas lighters and burglar alarms. He ran his own wires, made all his apparatus, and put in every part of the installation himself, but never had any training, and has acquired all his information by reading and observation. Mr. Jackson has our congratulations, and is entitled to the praise of every one who likes to see the leisure hours of the mechanic and laborer usefully and intelligently employed. We have no doubt that he will press onward in his study and practice, and his case is one of many in support of our frequent assertion that electricity is a science open to all.

IT will be a piece of discretion for the International Telegraph Conference, which assembled in Berlin on Monday last, the 10th inst., to deal very gingerly with Prince Bismarck's proposition to establish a uniform cheap tariff for all Europe. The sixpenny rate, scheduled for next October, has been postponed in England, and we see no reason why a man sending a message from London to Paris should be taxed to pay the extra expense of another man's message from London to Constantinople. Wherever a uniform rate obtains over a vast tract of territory, the "long-haul" people get all the benefit and the "short-haul" people pay all the expenses. The ancient custom of carting a skeleton around at the banquet, as a kind of reminder of certain unpleasant possibilities, might be revived at this Berlin conference, if they are going to discuss cheap rates; and we can accommodate them with the cadavers of the late Bankers & Merchants', Mutual Union, and some other concerns that met a premature death not wholly unconnected with cheap rates.

AN increase of only 435,000 in the number of telegraph messages during 1884–5, as compared with the preceding year, is reported by the English Postmaster-General. The slow rate of increase is naturally attributed to the telephone and also, very oddly, to the "rapidity of the letter post." When the telegraphs were first taken over by the Government the number went up three or four millions every year; but now the rate falls, as shown, below half a million on a total of 33,278,459. The revenue of the service is paying nothing on the capital invested, and should the reduction of the tariff actually be enforced, there will be a greater expenditure with even less return. We cannot draw very hopeful inferences from this state of things, and we certainly can find in it no argument for governmental control. England, with her unremunerative telegraph service, and her restricted telephone service, is no example to this country. It may be, as hinted by one observant critic, that England has exhausted the possibilities of her telegraphic development.

WE have commented in another item on the statistics of the English telegraphs. It appears that one reason offered for their present unprofitable state is the competition of the telephone. And yet the telephone has had anything but fair play and a clear field in England. The Government department has now 27 telephone exchanges open in various towns, with 1,141 subscribers, who pay $110,000 a year. Of course the bulk of the business is done by the private companies, about which we print an interesting article to day, but their royalties barely reach $100,000 per annum. After all, as the telegraphs do not pay, it might be good policy for the Government to show more liberality with the telephone; or the Government might try the effect of farming out its telegraphs. We incline to the opinion that there are plenty of men in England who could run the telegraphs, guarantee the Government fair interest on the investments and plant, and yet make money for themselves. But if the telephone continued then to be as hard to get as now, the tables would be turned, and it would fall into utter disuse. It may be said that the royalty paid by the private companies to the Government is not of great amount, but it is not the royalty alone that cripples their enterprise.

WE note with pleasure the triumphant result of the effort made by the New York *World* to raise $100,000 for the erection of the Bartholdi statue pedestal. Our contemporary has raised more than $2,000 above that large sum in about five months, during which period it has devoted itself to the work with much ability and energy, and with great outlay of its own time and resources. The *World* took up the matter when the people were downright sick of hearing about the pedestal, and when serious business depression had convinced most of them that the sum required could not be raised. It is hard to create enthusiasm about anything that has become the butt of ridicule and satire; yet, by a lofty appeal to the right spirit, and a dextrous touching of the right chord, the *World* brought about a remarkable revulsion of feeling, with the striking result which we record. Some detractors sneer that the *World* has meantime done itself a very good turn. If it has we are heartily glad of it. Any newspaper that espouses a neglected cause, and gives its space, and staff and time to the work of making that cause a success, deserves all the concurrent good that can come to itself from its patriotic and philanthropic action. We have esteemed it an honor to open an auxiliary fund, and now take pride in the thought that besides the $300 and more we turned in, the electrical community contributed directly several times that amount. When Liberty lifts on high her electric torch in New York Bay, electricians will have reason to felicitate themselves upon the important share they had in the great work.

WESTERN UNION stock has been remarkably active during the last two weeks on the strength of the report that Mr. Gould has been offered the control of the Baltimore & Ohio lines in return for help to the Baltimore & Ohio Railroad in its fight with the Pennsylvania Railroad Company. The stock rose buoyantly, but within a few days has declined, and is still coming down. The reports of negotiations between the companies have been so persistently made and so strenuously denied, that the correspondence which we publish in another part of to-day's issue will be read with much interest. It is not always safe to form conclusions on partial and incomplete statements, but it seems clear, from the dispatches, that negotiations looking to an arrangement between the companies—not, perhaps, an out-and-out sale, but a consolidation of some sort whereby the Western Union should once more have the virtual monopoly of the telegraph business in this country, not only of the land lines but possibly also of the cables—were entered into by Mr. Garrett on the one side and Messrs. Gould and Pender on the other. Both sides say that the first advances came from the other, but that really does not matter materially. Those who regarded the B. & O. as a promising "opposition" company will be pained to see from the correspondence that, notwithstanding the many and explicit promises of "maintaining its independence," the Baltimore & Ohio is apparently perfectly willing to place its telegraph lines under the control of the Western Union or any other company that will give it the terms it demands. The hitch in the negotiations seems to have been that the Western Union was unwilling to accept as a basis the valuation of the lines fixed by the Baltimore & Ohio, while the latter company refused to permit an examination of its books, which the Western Union thought would have shown that its rival was doing business at a loss.

The Electrical Determination of the Velocity of Projectiles.*

BY PROF. EDWIN J. HOUSTON.

(*Concluded.*)

In the Schultz chronoscope, a carefully tuned fork is caused to mark a waved line on the blackened surface of a revolving and sliding cylinder. This waved line serves as a scale of actual time, for, if the rate of the fork's vibration—that is the number of complete vibrations, or to and fro motions it makes in each second—be known, then clearly each wave on the blackened surface will have been made in a known time.

Suppose, for example, that Fig. 5 represents the waved or sinuous line traced on the blackened surface by the fork, then while the fork is making one complete swing to and fro, it will trace the waved line between 0 and 1, or between 1 and 2. Consequently the cylinder has moved through the distance of the straight line between 0 and 1, while the fork has completed one to and fro motion. If, therefore, the fork makes 23 complete vibrations per second, the length of this line represents the $\frac{1}{23}$ part of a second of time. Or, if the fork make 512 vibrations per second, the line 01 would represent the $\frac{1}{512}$ part of a second. The use of tuning forks evidently permits very minute intervals of time to be readily and accurately measured. Their use also permits the velocity of a projectile to be measured at a sufficient number of points throughout its flight, to enable the law of its movements through the air to be studied, for it is evident from the extent of surface that can be given to the revolving cylinder that the number of targets and their distance apart can be greatly varied.

The details of the Schultz chronoscope are shown in Fig. 5. The revolving cylinder is seen at 1. The clockwork at 2, driven by the suspended weight, serves to impart to the cylinder a motion of rotation and translation. A handle attached to the driving axis serves to rotate and move the cylinder independently of the weight.

The tuning fork 4 is kept in constant vibration by the action of the electro-magnets placed as shown. A flexible point, attached to one tine of the fork, can be caused to touch the surface of the cylinder when so desired. The interrupter 6 makes and breaks the circuits of the battery, energizing the electro-magnets that keep the fork in constant vibration. This interrupter acts in the usual manner.

The mercury interrupter has been applied by the inventor as best serving to insure constancy and continuousness of the fork's vibration. This interrupter is, however, extremely sensitive and difficult to adjust. Lieutenant Russel, of the Ordnance Corps, has dispensed with the interrupter and caused the fork to do its own "rheotoming."

The well-known sensitiveness of a tuning fork to hygrometric changes in the atmosphere necessitates, in the determination of very minute intervals, that its previously ascertained rate of vibration be discarded and its rate determined at the same time as the exact record. For this purpose the Froment pendulum accompanying the apparatus is not sufficiently delicate. Messrs. Bond, of Boston, have made for the Ordnance Corps a seconds break-circuit chronometer, which, by the insulation of the breaking screw, gives a half seconds break, entirely independent of the chronometer train.

Michaelis has simultaneously applied two break-circuit chronometers, by means of two induction coils, for determining the true rate of the fork.

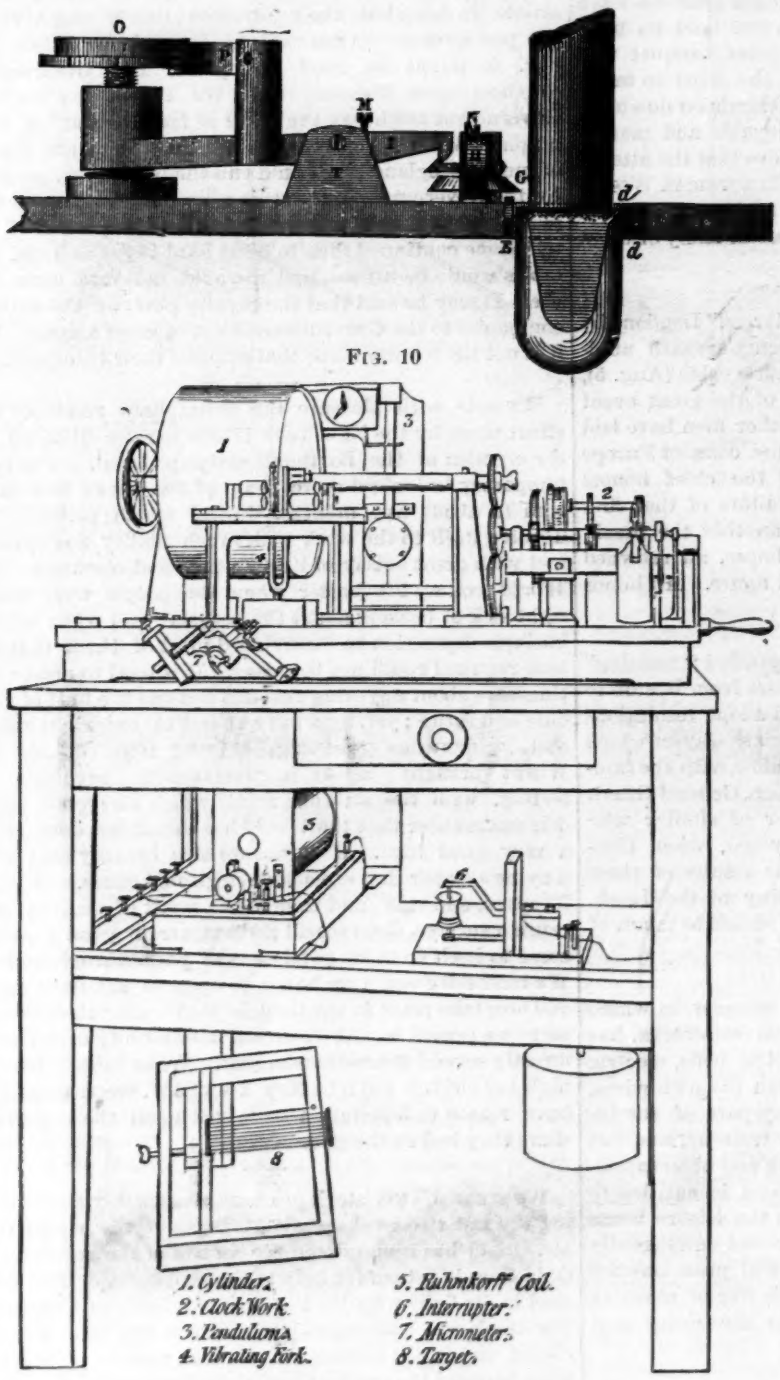


FIG. 10

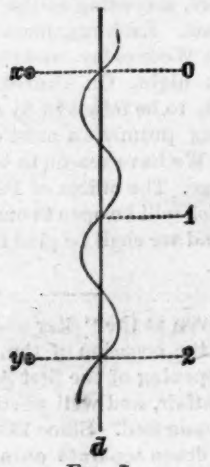


FIG. 7.

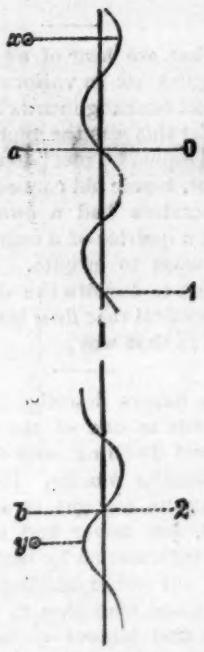
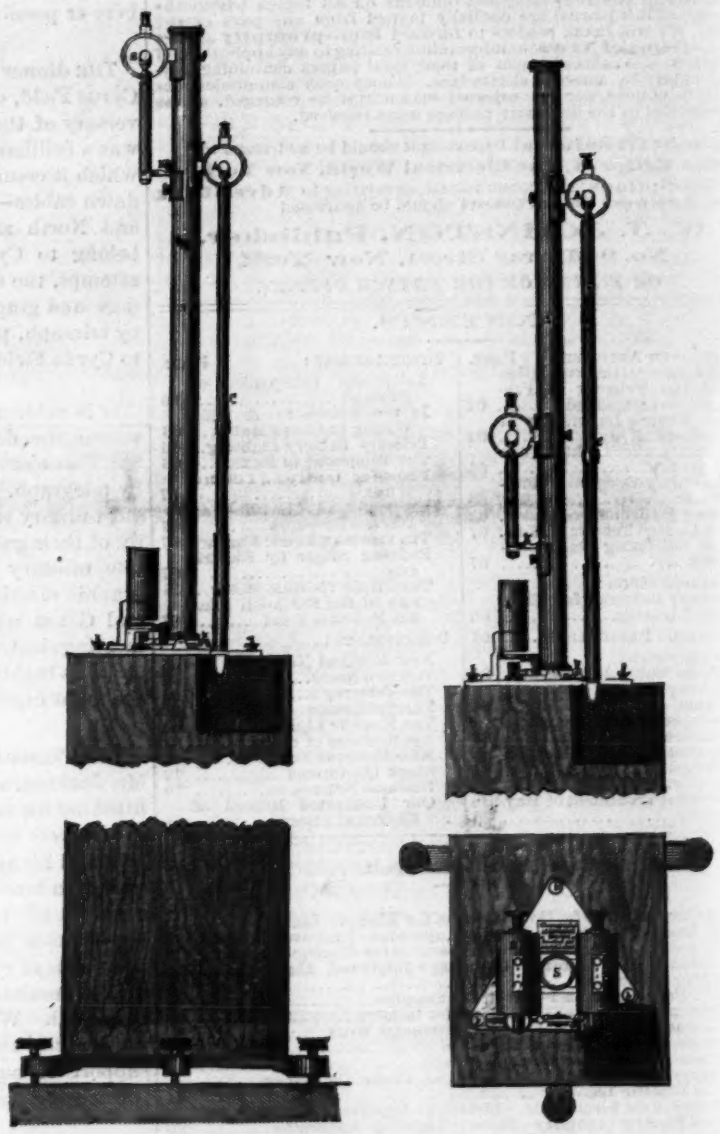


FIG. 5.

FIG. 6.—SCHULTZ CHRONOSCOPE.



FIGS. 8 AND 9.—LE BOULENGE CHRONOGRAPH.

The mean number of vibrations per second were:

By first chronometer	248.2575
By second "	248.2276

The Ruhmkorff coil 5 has its primary included in the circuit of one of the wire targets, and, at the moment of its rupture, produces an induced current in the secondary that discharges as a spark, and so makes a mark on the surface of the cylinder.

The general arrangement of the wire screws or targets is shown at 8. The projectile piercing the target at any point causes a break in the circuit in which it is included.

The micrometer at 7 is employed to divide one complete vibration or waved line on the surface of the cylinder into minute parts. By its use intervals of time as small as the $\frac{1}{1000}$ part of a second can be easily read.

The pendulum 3 is of use to determine the exact rate of vibration of the fork.

Suppose, now, the cylinder be rotated and translated, and the ball successively rupturing two wire screens, the sparks from the Ruhmkorff coil produce markings at x and F on the cylinder alongside the sinuous or waved lines shown in Fig. 7. The rate of the fork being known, the time of flight between the two targets is readily calculated.

Should the markings made by the rupture of the targets not come exactly opposite the figures 0, 1, 2, etc., the micrometer is employed to ascertain the fractional part of the vibration.

It is an essential feature of the Schultz chronoscope that the circuit ruptured by the projectile's passage through the first screen, must again be closed before the projectile arrives at the next screen. Various devices have been used to this end. Michaelis has applied with considerable success the simple and convenient expedient of an ordinary telegraphic relay.

In the Le Boulengé chronograph, the time required by the ball to pass between the two screens is deduced by observing the distance of the free fall of a heavy body during such time. This instrument is, therefore, different from the electro-ballistic pendulum apparatus already described, in that the movements of all pendulums is necessarily constrained by the fact of their suspension, or, quoting Michaelis in his description of this instrument, it "reduces the pendulum to its bob and allows it to fall freely."

In the Le Boulengé chronograph two rods, one of which is longer than the other, are suspended by means of electro-magnets and permitted to fall freely when the circuits of their supporting electro-magnets are broken by the successive ruptures of the wire targets. The longer rod is included in the circuit of the first target and is therefore released first, so that while it is falling the shorter rod is released. A brief interval after falling, the shorter rod strikes a trigger which releases a spring and causes a knife to make an indentation in the larger rod. There is thus obtained the distance through which the longer rod has fallen freely while the ball is passing through the distance between the two screens, plus the time required by the instrument for its operation. Were both rods simultaneously released, the longer rod would receive a mark near its lower end. The nearer the mark, therefore, to this end, the greater the velocity of the projectile.

The Le Boulengé chronograph may be used as a velocimeter, or as a micro-chronometer. In Fig. 8 the instrument is shown in position as a velocimeter.

The longer of the two rods is shown at C, and is called by the inventor the *chronometer*. It is a long cylindrical rod, enveloped by two zinc tubes, D and E, called the *recorders*. The chronometer rod is held in position by the attraction of the electro-magnet A, on a spherical iron armature at its upper extremity. The coils of this electro-magnet are included in the circuit of the first wire target through which the ball passes.

The shorter rod E, called the *registrar*, is placed as shown, and is supported by the attraction of the electro-magnet B, for its spherical iron armature, in a manner similar to the support of the longer or chronometer rod. The coils of the electro-magnet B are included in the cir-

* *Journal of the Franklin Institute*, August, 1885.

cuit of the second wire target through which the projectile passes. When the registrar rod falls on the rupture of the second target, the free end of the lever *I* is thereby depressed, the main spring is released, and the knife thrown against the falling chronometer rod indents the upper recorder. A hollow tube *L*, intended for the reception of the registrar rod *F*, is adjusted so that the rod falls without touching it.

The details of the indenting apparatus are shown in Fig. 10. The lever *I*, pivoted at *T*, releases the main spring *H*, and permits the circular knife *G* to indent the upper recorder.

In order to insure the free fall of the rods, the electromagnets are preferably weak, though of course strong enough to support the rods with certainty. In this manner the errors due to the residual magnetism, which result in a short interval, elapsing between the fall of the rods and the rupture of the screws, is diminished.

When the Le Boulengé chronograph is employed as a velocimeter, as in Fig. 8, and the distance between the two wire targets is comparatively great, the chronometer rod receives an indentation near the top, or at the moment of time when it is falling with its maximum velocity, and therefore minute differences in time are recorded by comparatively great differences in height. When, however, the interval is exceedingly small, this arrangement of the apparatus has the disadvantage that the record of the fall of the registrar rod is received by the chronometer rod near its lower end, where the velocity of fall is small. A different arrangement is therefore desirable when it is wished to employ the apparatus as a micro-chronometer. This is effected by a very simple readjustment of the instrument. This readjustment is shown in Fig. 9, where the instrument is represented in position for use as micro-chronometer.

In this figure it will be observed that the registrar rod with its stop and supporting electro-magnet *B* is removed to the upper part of the instrument. They are now included in the circuit of the wire target that is broken first. The longer rod therefore begins to fall after the first has been falling, and when *B* strikes the lever *I* at the lower part of the apparatus, it causes the indent to be made on the upper recorder, or when the longer rod has its greatest velocity. By means of this ingenious modification very minute intervals of time are easily and accurately measured.

In the preparation of the above descriptions the author has consulted the work by Benêt on "Electro-Ballistic machines and the Schultz Chronoscope," and the work by Michaelis on "The Le Boulengé Chronograph." He is indebted to these works for the accompanying cuts.

The Weston Laboratory at Newark, N. J.

The laboratory of Mr. Edward Weston, at Newark, is, without doubt, more completely fitted and arranged than any other in existence. Here, surrounded by a large staff of assistants and men, he develops the details of his systems of lighting and engages in original scientific research. The majority of the instruments of precision with which this work is conducted have been designed by Mr. Weston himself and constructed under his immediate supervision in the experimental workshop attached to the laboratory and it would be difficult to excel them in accuracy, excellence and finish.

On entering the laboratory on Orange street, Newark, the visitor is conducted from the hall into an office, where a staff of clerks is engaged in collating, indexing and arranging in convenient form for reference the records which are kept of all experiments and tests made and conducted in the laboratory, no matter how simple. All the new scientific publications are here examined, translations of those in foreign languages made, and all items of interest indexed for facility of reference. To the left of the clerical department is Mr. Weston's private office, and on the right is the draughting room, where all designs for apparatus are made and detailed drawings and tracings produced for the factory. Like system in arranging and indexing prevails here. Adjoining the draughting room is the experimental workshop, where a staff of skilled mechanics is at work upon instruments and experimental models, and the thousand and one appliances and odd work which experiment on such a scale as conducted by Mr. Weston entails.

The office opens into the main laboratory shown in our illustration, made by *La Lumière Electrique* from a photograph furnished to it. In this laboratory are carried on general and physical experiments, and here in glass cases are apparatus of all kinds ready for immediate use. On the left of this room are the mercury vacuum pumps used for incandescent lamp experiments; and in the right hand upper corner are two mechanical air pumps of special design, worked by power.

Near these pumps on the wall are arranged switchboards connected by wires with machines in the dynamo room, which adjoins the main room, and from which wires run to all parts of the laboratory, so that current may be directed to any required point. The field wires are in like manner arranged so that the particular dynamo in use may be regulated by rheostat at the point where its current is being used.

The dynamo room has machines of all grades set up in it, so that any strength of current may at all times be available for experimental and other work. The dynamos are driven from a Porter-Allen high speed engine of sixty h. p., in an engine room adjoining.

The main laboratory opens into an electrical testing room, in which are set on pillars of masonry reflecting galvanometers, Wheatstone bridge and other instruments of great accuracy and delicacy. A chemical laboratory is again entered from the room and is fitted and stocked for all descriptions of chemical work.

On the right of the electrical testing room, passing through the room where the factory testing is done, and through the engine room, the visitor reaches the dynamometer and photometer room. In this is another Porter-Allen engine, a dynamometer specially designed and built by Mr. Weston, and a photometer also of special construction. This room is wired to put the machine on the dynamometer, the photometer and the instruments in the testing room in connection, so that by a system of signals simultaneous observations may be made electrically, photometrically and for mechanical energy.

A multiplex photometer has also recently been added to the laboratory in a room above the dynamometer room, so arranged that a large number of incandescent lamps may be set up for life test, and daily observations made of each lamp with rapidity, both electrical and photometrical.

WESTON LABORATORY, UNITED STATES ELECTRIC COMPANY'S WORKS, NEWARK, N. J.

The arrangements in Mr. Weston's laboratory are all the result of long experience and thought, with a view to great accuracy of determination and simplicity and rapidity of obtaining results, and it would be difficult to imagine anything more complete and workmanlike.

There are many other departments, such as storage battery room, battery room, etc., and a model room in which are stored models, numbered and indexed with the same order as is observed in the other departments.

Detailed and illustrated descriptions of apparatus in the laboratory will be found in the following articles in our last volume: "Laboratory Rheostats," May 16; "Photometrical Measurement of the Incandescent Lamp," May 23; "Exhausting the Air from Incandescent Lamps," May 30; "Weston Regulator and Indicator for Central Stations," June 13; and "Weston Field Explorer," July 18.

VIENNA is now to have a large central electric light station, and the notable feature of this important event is that the Imperial Gas Association undertakes the work. The station will maintain 12,000 sixteen candle-power lamps, with a plant of 4 steam engines of 200 horse-power, 4 dynamos and 9,600 accumulators. This is an experiment worth making, and has our best wishes. Europe has need of a few more central stations. We find no statement to the effect that the circuits will be run underground.

Atlantic Cable Anniversary.

In London, on the 5th inst., over 250 distinguished guests—Englishmen and Americans, the latter including Chief-Justice Waite and Minister Phelps—dined at the "Star and Garter" with Mr. Cyrus W. Field, in celebration of the twenty-seventh anniversary of the opening of the Atlantic Cable. "The Queen" and "The President of the United States" were toasted, and many brief speeches were made. The Lord Mayor of London, in proposing the health of Mr. Field, said that the world at large was proud of him as an illustrious benefactor of the human race.

It was fitting to recall the statement made by Lord Derby, that honors would have been conferred by the Crown upon Mr. Field if he had been a British subject and not an American.

The following dispatch was received:

AUGUSTA, Me., Aug. 5.—Cyrus W. Field, Star and Garter Hotel, Richmond, England: I thank you for the agreeable surprise of your message. The failure of the first cable, the general amusement at De Sauty's straggling dispatches, the incredulity of the American public in ocean telegraphy in 1858, are fresh in my memory.

The discouragement would have broken down any man but one of your energy and faith. Let me propose to your distinguished company the health of the Field family, eminent in every profession to which they have devoted their power.

JAMES G. BLAINE.

Among the toasts proposed by Mr. Cyrus W. Field were: "The Illustrious Memory of General Grant" (this was drunk in silence); "Success of the Atlantic Cables: may they perpetuate the peace and prosperity of two great kindred nations." These toasts were responded to by Senator Hawley, Sir Daniel Gooch, Bart., M. P.; Sir George Elliott, Bart, M. P., and Sir James Anderson. Another toast was "The Men of Science and Enterprise to whom submarine telegraphy is largely indebted—Professor Sir William Thomson and Sir Charles Bright." The Lord Mayor proposed the health of Mr. Field.

Mr. John Bright and Mr. John Pender sent letters expressing regret at their inability to attend the banquet.

The *Standard* next day said that the history of telegraphic cables is more interesting than many a romance and that Mr. Cyrus W. Field is its hero.

Telegraphers Honoring Grant.

Pursuant to the call of William R. Plum, President of the Society of Military Telegraphers of the late war, throughout the Union, to take action on the death of General Grant, by the kind courtesy of the Western Union Telegraph Company, a meeting of the survivors of the corps was held by telegraph on the 6th inst., Mr. Plum presiding at Chicago; William B. Somerville, at New York; Robert B. Lines, President of the District of Columbia branch, at Washington; T. A. Davin, at Boston; William B. Wilson, at Philadelphia; Joseph Anderson, at Buffalo; George Cole, at Columbus; T. E. Moreland, at Pittsburgh; L. C. Wier, at Cincinnati; L. A. Somers, at Cleveland; Duncan T. Bacon, at Indianapolis; E. M. Shape, at Milwaukee; Isaac McMichael, at Minneapolis; C. W. Hammond, at St. Louis; L. H. Korti, President of the Western branch, at Omaha; J. H. Nichols, President of the Colorado branch, at Denver; D. E. Martyn, President of the Kansas City branch, at that place, and Col. R. C. Clowry, at San Francisco.

The President submitted resolutions which had been prepared for that purpose to the members assembled at the above-named cities and others on the various telegraphic circuits and received the most hearty and unanimous indorsement thereof. He was told that at some of the local meetings many feeling addresses were made. The resolutions were in effect that the secretary be instructed to purchase a portrait of the great commander, cause these resolutions to be written thereunder and to frame, drape and produce the same at all reunions as a token of affection for the hero of Appomattox, deservedly twice President of the United States.

The International Telegraph Conference.

The International Telegraph Conference opened its sessions at Berlin, Prussia, on the 10th inst. Dr. Stephan, Imperial Minister of Posts and Telegraphs, was chosen President. The rules of procedure observed at the International Telegraph Conference in London were adopted.

Two committees were appointed, one to consider the various propositions placed before the convention representing telegraph tariffs, and the other on technical questions connected with the working of telegraphs. It was found, on the assemblage of the Conference, that the mass of business which has been placed before the body for discussion will necessitate a session of from four to six weeks.

On the first day, papers were read bearing on the proposal to compile statistics relative to electrical measurements of the effects of atmospheric currents and thunder storms.

It is believed, says a cable dispatch, that the voting in the Conference on Prince Bismarck's proposition, to establish a uniform tariff for all Europe on messages passing from country to country of four or five cents a word, will be very close. The Eastern Telegraph Company strongly opposes the proposal, on the ground that the company's receipts would be seriously diminished if it had to transmit messages to and from the borders of Europe for anything like five cents a word.

Incandescence Lights on Arc Light Circuits.

BY ELROY M. AVERY, PH. D.

In the Brush multiple series system of incandescence electric lighting, seven Swan lamps (38 volts each) are placed abreast in the arc light circuit to receive the ordinary 10 ampère (2,000 c. p.) current. Eight lamps may be used, but the total amount of light yielded is less than with seven. Six lamps may be used in each group, the light of each lamp being brighter, the power required for the group being greater, and the length of life of the lamps being thus shortened. The ten ampère current being thus divided between seven lamps, each carbon carries 1.43 ampères. If one lamp breaks, the remaining

FIG. 1.—MULTIPLE SERIES CUT-OUT BOX.

six carry the whole current, or about 1.66 ampères for each carbon. This increased current would increase the probability of a breakage among the six. When the second carbon is thus ruptured, each of the five remaining lamps would have to carry nearly two ampères of current. The third and all of the remaining lamps would then quickly be destroyed, thus opening the circuit.

To prevent such a result, each group of lamps is provided with a "Multiple Series Cut-Out Box," which also serves

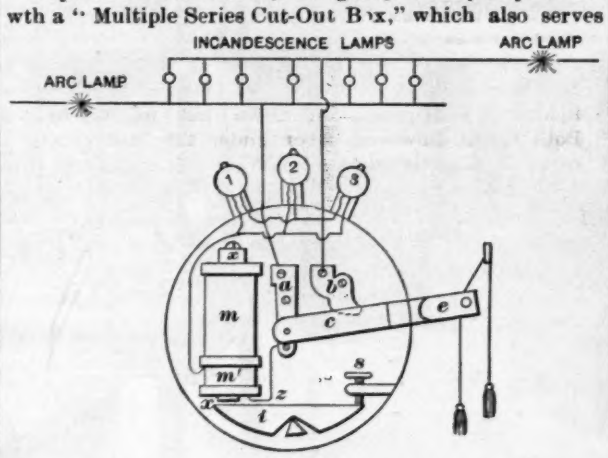


FIG. 2.

as a switch for turning the lights on or off. The box is about seven inches (17.5 centimetres) in diameter. Its external appearance is shown in the accompanying illustration, Fig. 1, and its construction and operation are simple, the apparatus requiring no attention after first adjustment.

In Fig. 2, *a* and *b* are metal pieces, with binding posts for the reception of the terminals of the main line. A metal lever *c* is pivoted at *a*, and is worked by an insu-

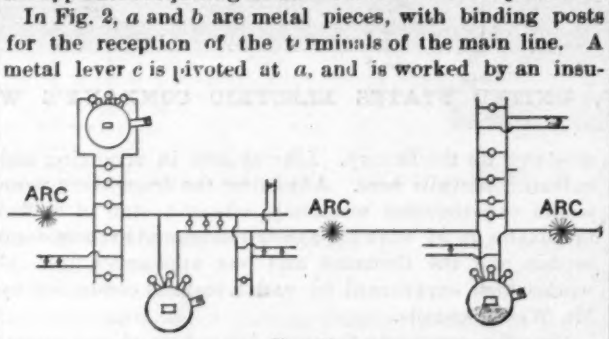


FIG. 3.

lated handle *e*. *m* is an electromagnet with a coil of high resistance, whose terminals are connected with *a* and *b*, and which is always in the circuit. (The connections are omitted in the diagram.)

m' is a coil made of a few turns of stout copper wire, one end of which is connected with each of the incandescence lamps, 1, 2 and 3; the other end of the wire is flattened and is supported at *z*, just above an insulating pad resting upon *i* and slightly separated from the wire, running down from *a*.

A heavy armature *i* is carried upon a knife edge, adjusted by the screw *s*, and attracted by *x*, the core of *m* and *m'*; 1, 2 and 3 are incandescence lamps placed abreast in the circuit between *m'* and *b*.

The arc light circuit may be cut at any point and a group of incandescence lamps placed abreast, as shown in the diagrams Figs. 2 and 3. One of the multiple series cut-outs is connected with each such group, the connections being made so that the cut-out shall bridge the group as if it were another lamp.

When the lever *c* is raised, as shown in Fig. 2, all of the lamps and the cut-out are short-circuited. When the lever is pulled down the whole current passes through the group of lamps and the cut-out magnet, *m*—the lamps 1, 2 and 3 as well as *m'*, being open-circuited at *z*.

The armature *i* is adjusted so that when the resistance of the group of incandescence lamps is normal (*i. e.*, when the proper number of lamps is working in the group), the current shunted through *m* is so small that *x* is unable to raise *i*. But if a lamp in the group be broken or removed, the greater current thus shunted through *m* causes the armature to rise and close the circuit at *z*. This throws the cut-out lamps 1, 2 and 3 into the circuit, and protects the remaining lamps of the group from breakage by the increased current that would otherwise pass through each. The coil *m'* now aids in holding up the armature and keeping the circuit closed at *z*.

The lamps of the group being thus dimmed, attention is called to the fact that one of the lamps has broken and has been replaced by the three on the cut-out box. A sound lamp being substituted for the broken one, the cut-out lamps are open-circuited by raising the lever *c* and immediately lowering it. As soon as the lever is raised, the magnets *m* and *m'* are short-circuited and the armature falls, thus opening the circuit at *z*. The subsequent lowering of the lever sends the whole current through the group of lamps and the fine wire coil *m* as at first.

It is evident that each group may be turned on or off at will, but that the individual lamps of a group cannot be thus controlled. As the system is intended for stores, offices, etc., rather than for residences, and as the lights are designed for rental at a given price per group for a specified number of hours, the inability to turn out a single light is not a matter of considerable inconvenience. Of course, it is easy to arrange the circuit with three-point switches or other familiar appliances so that one lamp may be darkened and another one lighted. This may be convenient in some cases, as when a lamp is placed in a cellar and the switch at the head of the cellar staircase. In other words, it is as easy then to switch the current into another lamp as it is to switch it into a German silver helix of equal resistance, but nothing would be gained thereby, as the power required would be the same, whether the lamp were burning or not. It is apparent from the above description that no safety fuses are required, and consequently none are used.

The United Lines Telegraph Company.

At last some sort of order is being evolved from the muddle and chaos of the Bankers & Merchants' Company. A meeting of the stockholders of the United Lines Telegraph Company was held at the Hoffman House on August 7. A Board of Directors was chosen, consisting of Edward S. Stokes, John Anderson, Alfred Sully, Dwight Townsend, A. H. De Haven, George Turnbull, B. H. Allen, Henry A. Tappin and Horace Stokes. The capital stock was increased from $10,000 to $3,000,000. The Board subsequently met and E. S. Stokes was elected President, John Anderson, Vice-President, and Dwight Townsend, Secretary.

Mr. Stokes announced that he had purchased at the sale by the referee on the 31st ult. all the property, franchises and subsidiary lines of the Bankers & Merchants' Telegraph Company, and that he was prepared to transfer the same to the United Lines Telegraph Company, in accordance with the reorganization scheme of the bond and security holders of the Bankers & Merchants' Company. He said also that he was prepared to satisfy all prior liens upon the property until the new company was fully organized and prepared to issue its bonds, which would consist of $1,200,000 of first-mortgage bonds and $3,600,000 of second-mortgage, which would represent a total issue of stock and bonds of $3,000,000 stock and $4,800,000 of bonds, against $3,000,000 of stock and $10,000,000 bonds of the Bankers & Merchants' Company.

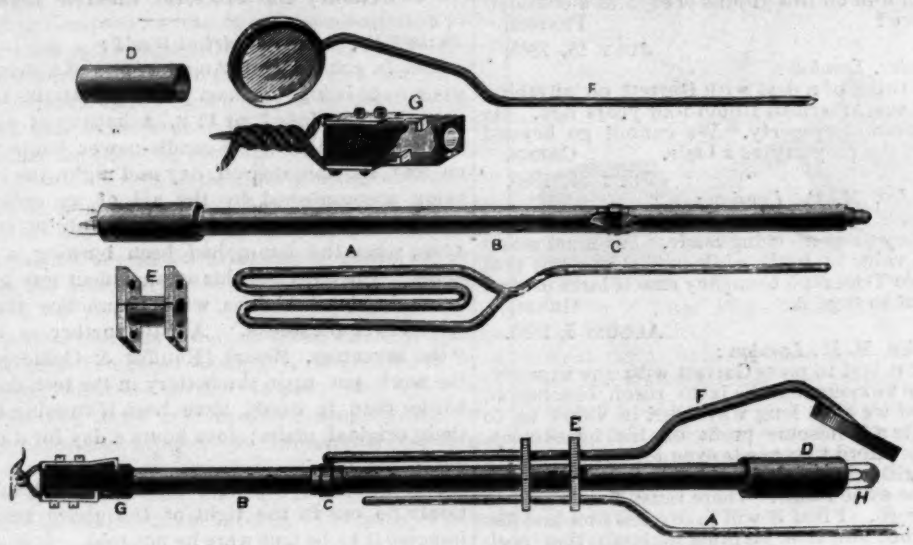
Arrangements will be made at once to replace the wires taken by the American Rapid and extend the lines throughout the West, and in a short time a complete and efficient system will, it is said, be established, embracing all sections of the country.

The Phytolacca Electrica.

A recent German publication contains a description of a new electric plant that has been christened Phytolacca electrica, which possesses strongly marked electro-magnetic properties. In breaking a twig the hand receives a shock that resembles the sensation produced by an induction coil. Experiments made on this plant showed that a small compass was affected by it at a distance of about 20 feet. On a near approach the needle vibrated, and finally began to revolve quite rapidly. The phenomena were repeated in reverse order onreceding from the plant. The energy of the influence varied with the time of day, being strongest at about two o'clock P. M., and becoming almost nothing during the night. It was also greatly increased in stormy weather; and when it rains the plant seems to wither. It is said that no birds or insects are ever seen on or about this plant. The soil where it grew contained no magnetic metal like iron, cobalt or nickel, and it is evident the plant itself possessed this property.

The Carter Surgical Illuminator.

The applications of electricity in medicine and surgery tend to multiply apace, and scarcely a day passes when the physician or electrician is not called upon to inspect or use some new device. In surgery and dentistry of late the incandescent lamp has been found of great value, and to-day we illustrate, in the Carter surgical illuminator, one of the most interesting and serviceable instruments by means of which all the cavities of the human body can be examined without inconvenience to the patient. This instrument, made by the United States Electrical Company, of this city and Brooklyn, is illustrated on this page by two cuts, showing it in detail and assembled for use. Fig. 1 is the illuminator complete. In Figs. 1 and 2 *A* is the tongue depressor, *B* is the holder, *H* the lamp, *C* the circuit closer, *D* the hood, *E* the clamp, *L* the mirror and *G* the connector. The tongue depressor is made of open-work bent wire. It holds the tongue firmly without depending on a roughened surface for the purpose, and of course is easily susceptible of any required change in size, which would not be possible if it were solid. The mirror is adjustable in any position and can be used with or without the hood. The lamp is mounted in metal and is connected by simply screwing to the holder. The circuit closer being telescopic, it will, whether open or closed, remain in position without necessity of readjustment; and consequently the holder can be held by any part or in any position and the hand of the operator will not be cramped. The conductors are so run that it is impossible for the operator or the patient to receive any shock; and its construction is such that it is only necessary to slip the connector over the lower end of the holder. As the whole instrument is made of silver-plated metal, there are none of the objections to it that may arise in regard to rubber, for example, when that substance is heated by the lamp or the hand, and has deteriorated with age. The use of this metal also makes the instrument very light, compact and durable, and enhances the beauty of it. The company makes this instrument of standard length—six inches—or of any length that may be required.



FIGS. 1 AND 2.—THE CARTER ILLUMINATOR.

Electrical Treatment of Hay Fever.

From the report of a committee of the United States Hay Fever Association, appointed to collect scientific data, it seems that a remedy for this desperately obstinate malady has at last been found. This report, published in the Philadelphia *Ledger* of the 6th inst., contains the results of Dr. Charles E. Sajous' experiments in treating hay fever by the superficial organic alteration of the nasal mucous membrane. The theory was advanced by this Philadelphia physician in 1883 that hay fever is caused by the simultaneous concurrence of three conditions. These are: First, an external irritant, such as dust or the pollen of grasses, plants, flowers and cereals; second, a weakened state of the nervous system, rendering it susceptible to the irritant; and third, a sensitive condition of the mucous membrane of the nose. Dr. Sajous has found that the local irritation by dust and pollen is unquestionable, and he points with great force to the fact that the help which the "hay fever resorts" afford to patients is due to their elevation above the sea or to locations in which but little dust or pollen floats in the air. It has been clearly proved that hay fever patients, while enjoying comparative immunity at hay fever resorts, have brought on the paroxysms of the disease by handling dusty objects or by exposure to vegetable dust.

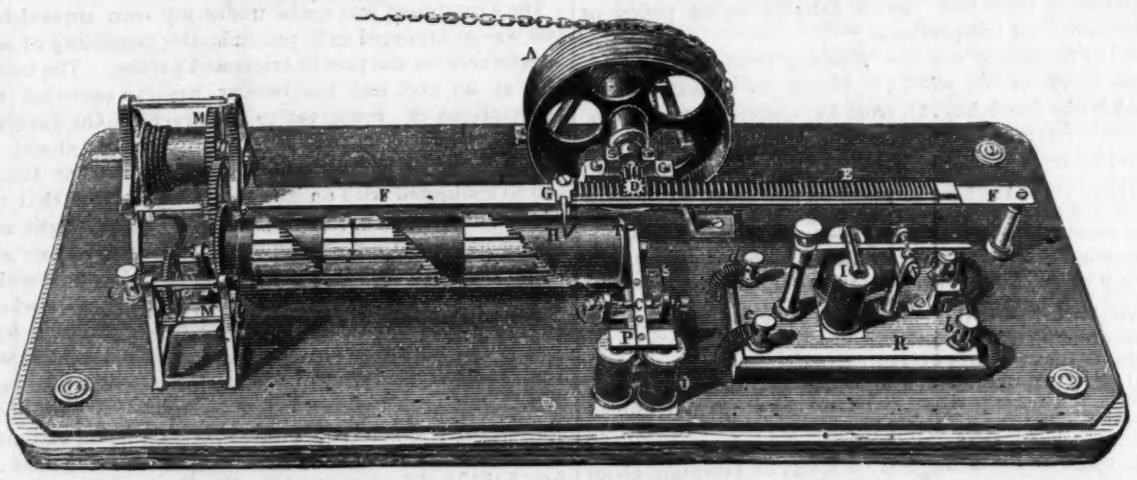
The treatment he has found adapted to these conditions is that each sensitive spot in the nasal mucous membrane is touched with the galvano-cautery or an acid, which alters the surface of the membrane and annuls its irritability. Once destroyed, the minute nerve fibres which were over-sensitive to irritant dust can never reform, and the cure is thus made permanent, there being no nerve left capable of transmitting to the weak nerve centres the impression of the agent to which the patient is especially sensitive. The number of applications necessary to give relief depends, of course, on the number of sensitive spots, but with a majority of patients about fifteen or twenty sittings are required.

The remedy may seem to some timid sufferers rather formidable; but when it is remembered that the disease has defied all previous methods of treatment, necessitating in many cases a sea voyage or sojourn at some remote hay fever resort (which after all can only afford partial and transient relief from the more acute symptoms), Dr. Sajous' treatment offers more hope than any other which has been brought to public notice in this country.

As to permanency of cure wrought by this somewhat heroic treatment, the report, prepared by Mr. M. Richards Mucklé, states that "a number of the cases thus treated being of two and four years' standing, more satisfactory evidence cannot be adduced." Old sufferers from the disease will be thankful to learn that, as the olfactory membrane is not involved in the new treatment by the cautery, the sense of smell is not impaired, but in some cases is improved—the reduction of the tumefactions on the membrane allowing odoriferous particles to reach the olfactories with greater freedom.

A New Hydrometrograph.

The hydrometrographs employed to indicate automatically the variation of level of water in rivers, canals, reservoirs, etc., are different in construction and are numerous, but they can all be reduced to two classes, viz., those that indicate by diagram, and those that indicate by dial. Both forms, however, labor under the disadvantage of requiring a special station with suitable apparatus to receive their indications. The apparatus of M. J. Ravaglia, the illustration of which we take from *La Lumiére Electrique*, differs from the two preceding classes, in that it acts like an automatic telegraph, transmitting, whenever desired, a dispatch in Morse characters, which can be received at any telegraph station, the receiver being an ordinary Morse instrument. Consequently the hydrometrograph can be connected with the nearest telegraph station or with the office of the chief engineer. It possesses the advantages of transmitting dispatches in dots and dashes, *i. e.*, Morse signals, and of permitting connection with any telegraph office.*



NEW HYDROMETROGRAPH.

The apparatus consists of a drum *A*, around which the chain *B*, which carries the float, is wound. This drum is 0.5 metre in circumference, and as the float rises and falls, turns in either direction by means of a counter weight. The binding post *C* is connected to earth. A pinion *D*, keyed to the shaft of the wheel *A*, gears with a rack *E*, which slides along the rod *FF*. This rack carries a small pin *G*, which comes in contact with the cylinder *H*. This cylinder is covered with an insulating substance, upon the surface of which are projections of metals of high conductivity. These projections are of varying lengths, and during the rotary movement of the cylinder the pin *G* comes into contact with them. The duration of contact depends upon the length of the projection, and hence the receiver traces dots and dashes of different lengths.

The longest characters represent metres; those of medium length, decimetres, and the dots, double centimetres. These dimensions correspond to the height of the water-level below the critical point. Whenever the float rises 2 centimetres, the rack *E*, moved by the pinion *D*, recedes an equal distance from right to left. The variation in height of level corresponds to the length of the lines. The scale adopted is based on the decimal system. Thus, four dots represent eight centimetres; a medium line, one decimetre. In this manner the 2.38 metres would be represented as follows:

— — — — — — . . . .

The cylinder *H* is moved by clock-work and weights whenever a detent is released. An electro-magnet *O* has an armature which is movable around the axis *Q*, and is so placed that its front end strikes against a projecting pin *T* on the cylinder. This prevents the latter from turning as long as the armature *P* is not attracted by *Q*. The electro-magnet *R* is a relay through which the line-current passes, which closes the local circuit in which the electro-magnet *O* is placed, and which controls the movement of the cylinder.

Whenever the key at the distant station is pressed, the current passing through the pin is interrupted as the various projections of the cylinder pass under it, and in this way the signals are transmitted.

It is evident that any telegraph line can be employed for this purpose, thus obviating the necessity of a special line for connection with the hydrometrograph.

*The inventor also claims as an advantage, the fact that the apparatus acts only when an indication is desired. This may be an advantage in some cases, but, ordinarily, an automatic periodical indication would seem to be preferable.—EDS. E. W.

Telephone Companies of England.

A Manchester correspondent of the London *Financial News* writes as follows in regard to the telephone companies of the United Kingdom:

The United Telephone Company is the parent company. It owns the patents, and, in conjunction with local promoters in the different districts, has created the other six companies. The names and capital are as follows:

	Established.	*Capital.*
United Telephone Company	June 3, 1880	£438,044
Lancashire & Cheshire Tele. Co.	May 31, 1881	296,161
National Telephone Company	March 10, 1881	619,200
Northern District Telephone Co.	Dec. 13, 1881	175,000
Telephone Company of Ireland.	May 27, 1882	190,350
Western Counties Telephone Co.	March 24, 1884	400,000
South of England Telephone Co.	Dec. 17, 1884	400,000
Total		£2,518,755

Some portions of the preference capital of the above may be still unissued, but even if so it would not materially affect the total. Three months ago there were only 12,730 users of the telephone in the United Kingdom, and it is consequently attempted to earn a dividend on £2,500,000 out of that limited number of persons. Of course the attempt has failed, as some of the above capital pays no dividend, and a portion pays only something trifling. We are accustomed at telephone companies' meetings to hear directors speak as if they were public benefactors, but all their utterances are capped by a paragraph in the annual report of the United Company, which has just been issued. This company—the creator of £2,500,000 of capital—says that until it gets some, comparatively speaking, trifling concessions about way-leaves, it will not be able to work the business as "economically" as the public demand. All this capital has not been subscribed by the public; £650,000 of it is in possession of the United Company. It appears as if capital was created and held with the view of an expected sale of the companies to the government. In their account the plant is put down at about £500,000, the rest being "privileges, rights, etc.;" but the actual value of the plant should not be taken at over £10 per user—say £127,300, or a little over one-twentieth part of the capital to be (if possible) supported out of it. But this is not all; £168,000 has been raised in money to carry on the business of manufacturing telephonic apparatus in this country; and £750,000, also mostly in cash, has been subscribed to carry on the telephonic business in other countries. The whole of this £918,000 can to-day be bought for a portion of the issue price. The foregoing does not include all the capital called into existence, and the whole of this super-

structure has been raised on the "Bell" telephone patent. The United Company own several other patents, but they are quite subsidiary; the monopoly has been created and is maintained by the "Bell." In his letter of the 4th inst., "Defense" asks: "What valuable invention was ever obtained without being highly paid for?" Perhaps he thinks Mr. Bell, the inventor, received a large sum. The truth is, all he got was fractional compared with the other "inventors," whose skill may be studied in many prospectuses.

Is the Baltimore & Ohio Willing to Consolidate?

We have heard considerable during the past few weeks regarding alleged negotiations for an arrangement between the Western Union and Baltimore & Ohio Telegraph Companies. The reports, however, were exceedingly conflicting. On the one hand it was claimed that the control of the Baltimore & Ohio had been offered to the Western Union, while on the other it was stated in the most positive manner that all the different rumors were wholly without foundation. On Tuesday of the present week, the president of the B. & O. published a number of cable dispatches received from Mr. Garrett in Europe, which seemed to show that, while representatives of the Western Union were following Mr. Garrett all over Europe with propositions looking to an arrangement between the companies, Mr. Garrett would not even listen to any such suggestions. One of the telegrams published was from Mr. Cyrus W. Field to Mr. Pender, and was as follows:

Russell Sage wants to know best terms that Garrett would sell his lines right out for money; if he will not sell right out, what terms would he accept upon a pooling or other agreement upon a fair basis. Mr. Field suggests that both companies agree to advance tariff at once, keeping separate, but under a fair and binding agreement.

Mr. Garrett's reply to this was explicit and positive. After repeating the message, apparently to give more weight to his refusal to entertain the proposal, he adds:

Cable Sage that Baltimore & Ohio declines, as heretofore, to sell its lines, which are not for sale at any price; also declines your proposition to advance rates.

A dispatch from Mr. Garrett to Mr. Field, at Queenstown, is also published, in which the latter is asked to "cable other side contradicting absolutely the lies which have been circulated about telegraph understandings," and threatening to give the above telegram and reply to the public unless Mr. Field before sailing should make such denial "positively and in satisfactory shape," and the same was repeated to Mr. Garrett.

In addition was a telegram from Mr. Pender to Dr. Green, stating that at the only interview which took place between Messrs. Garrett, Field and Pender, Mr. Garrett did not, as reported, make a proposition to sell the B. & O. system to the Western Union. A brief note from Mr. Garrett to the President of the B. & O. was added, asking that the matter be given to the press," with such additional information as may be necessary to explain our independent position."

Preceding these dispatches as published was a communication from Mr. Bates, in which he said that the Baltimore & Ohio had "never faltered in its policy of maintaining its independence."

On the following day the Western Union gave its side of the story to the public. Among the dispatches published is one dated Aug. 11, from Dr. Green to Mr. Pender, in which, referring to Mr. Pender's telegram to him, quoted above, he says:

I think you have been imposed on and must have acted under a misapprehension of the facts. No one in this company has represented that any deal with the B. & O. has been made. I have steadily and uniformly denied that there was any approximation to an agreement. Several interviews with me to that effect have been published. Garrett's card and your cablegram make it appear that we were pressing a negotiation, whereas your letter of June 22 shows that the first overture came from Garrett. You say: "The day after I despatched my message to you I received a message from Garrett to ask me to give him an interview, which I did. He told me his object in desiring that interview was to see whether the time had come, and if so, whether I was disposed to assist in bringing about an arrangement between the Baltimore & Ohio Company, on the one side, and the Western Union lines on the other."

You further say in that letter "that if the idea conveyed in the inclosed memorandum is entertained by you and your friends, I believe business could be done, and in that case it would be very desirable you should come over to London while Garrett is here." The memorandum referred to is marked confidential, but as showing a tangible overture from Garrett through you, I ask your permission to give it to our shareholders.

The other dispatches show that whatever negotiations there may have been, began about two months ago. The story is best told in the messages themselves:

LONDON, June 17, 1885.

Jay Gould, New York:

I am invited to meet Garrett at Pender's house Saturday morning, to talk over telegraph matters. Garrett says that he can arrange with Mackay so as to settle the tariff for the cables as well as the land lines in America. Have you any suggestions to make? FIELD.

NEW YORK, June 19.

Field, London:

I can only repeat what I cabled you the other day in reference to Mr. Garrett. His company are losing over fifty thousand per month in their telegraph business, and it is only a question of time when it will carry down the B. and O. company. This opinion is concurred in by the shrewdest bankers here. GOULD.

JULY 8, 1885.

Hon. John Pender, M. P., London:

Your letter received. We had same form of deal with Baltimore and Ohio Telegraph Company suggested here, but no figures proposed. Difficult for us to propose figures without data. Cannot Baltimore and Ohio Telegraph Company give order to admit examination of revenues and expenses? GREEN.

LONDON, July 14, 1885.

Dr. Norvin Green, New York:

The morning I received your telegram Garrett had left for Paris. I did not, therefore, see him. He left a memorandum for me which amounted to this: That he was not prepared to exhibit his books; that the Western Union Telegraph Company knew exactly extent of his system, and that the mileage of the Baltimore & Ohio Telegraph Company to-day was in excess of what the Atlantic & Pacific and the American Union were together at the time they were absorbed by Western Union Telegraph Company. He seems to take this as a basis. Do you see your way to deal with him on this ground or even at a considerably modified price? PENDER.

JULY 18, 1885.

Hon. John Pender, London:

We could not think of a deal with Garrett on anything like the basis of the American Union four years ago. He has no such amount of property. We cannot go beyond the cost value of the property as a basis. GREEN.

JULY 31, 1885.

Hon. John Pender, M. P., London:

No progress made with Baltimore & Ohio Telegraph Company here, nor any pressure being made. We must stand on a liberal cost value as basis, while indications are that Baltimore & Ohio Telegraph Company exacts large profits. Do not think best to urge it. GREEN.

AUGUST 5, 1885.

Hon. John Pender, M. P., London:

I do not think it best to press Garrett with any urgency. We are not more anxious than he is to reach conclusion, but I am satisfied we are a long way apart in views as to terms. He wants a handsome profit on his investment, which we cannot afford to concede even for the temporary advantage it might afford. It would only stimulate a new enterprise for the same result. There must be an end to taking in at a profit. I fear it will take some time and discussion to convince him that we must maintain that position. GREEN.

On the same day was published a telegram from Mr. Field, at Queenstown, to Mr. Garrett in answer to the one quoted above, in which Mr. Field says:

Telegrams received. Sent you short request I received by cable from New York. Advise you to communicate with Russell Sage any answer you wish to make. Know nothing of any lies or any other reports circulated in New York regarding you and myself. You certainly did tell me you wished to make some satisfactory arrangements settle telegraph war. Hope will have peace and plenty instead of war and poverty.

This dispatch was forwarded by Mr. Garrett to the president of the B. & O. Co. without comment by Mr. Garrett, except that any delay in sending it was occasioned by errors in the message.

Primary Battery Lighting.

Subjoined is the gist of a communication from "Laurentian" to the Boston papers on the subject of the tests with Kauffer-Goldner primary batteries, referred to in our issue of August 1:

The experiment was made under my own supervision, and was so arranged as to preclude the possibility of any interference on the part of interested parties. The test is now at an end, and the battery has far exceeded the expectations of conservative observers. On Tuesday, July 7, nine cells of this battery were closed in circuit with two eight candle-power incandescent lamps, and so connected with an automatic clock-work that the current was closed for five minutes and thirty-eight seconds, and opened for six minutes. The whole battery and clock-work was then inclosed in a suitable case, and sealed with wax seals; also every point in the conductors which could possibly be tampered with was fastened with a wax seal. The whole apparatus was so arranged that it was utterly impossible either to add anything to it or take anything away, or introduce any other electrical current in the circuit. The battery ran in this way, being automatically shut off and on from the lamp circuit, from noon of July 7 till 10 o'clock A. M., July 20. During this period of 310 hours the circuit had been closed and the lights burning for 151 hours. At 10 o'clock A. M., July 20, the battery was unsealed and examined, and found to be partly exhausted. The inner porous cups were then washed out and replaced, and at 11 o'clock A. M. on the same day, the battery was again sealed up and the circuit closed, this time not off and on, but continuously. The lights in this way burned with unabated brilliancy. At 5 P. M. on the following day, the circuit was broken, the lights having been burning continuously for 30 hours in addition to the 151 hours already accomplished. At 9 A. M. on the next day (July 22) the circuit was closed again till 5 P. M., the lights burning brightly all the while. On the next day (last Thursday) the circuit was again closed from 9 A. M. till 5 P. M. On Friday, July 24, the circuit was closed at 9 A. M., but was opened at 2 P. M., at which time the incandescent lamps had begun to burn low, showing that the battery was exhausted. Upon opening the battery it was found that the solution had been pretty well used up. The zincs were bright and clean, and had lost about one-seventh of their weight. Between 12 M. on July 7 and 2 P. M. on July 24, or during 408 hours, this battery of nine cells had lighted two eight candle-power incandescent lamps for 202 hours, or about half the time. So far as it is known, this has never before been accomplished. In fact, there is no account of any battery that has ever continued to light an incandescent lamp for one-sixth of that time, and yet several gentlemen interested in such matters have this last week made statements to the effect that batteries had been or could be readily devised that would favorably compare with the test above described. If such results have heretofore been obtained, they are certainly unknown to the writer and to the majority of electrical people. It is believed that it would be very interesting to the public if parties who have ever made a battery of nine cells that would light two eight candle-power incandescent lamps for 200 or 100 or even 50 hours without renewing the solution, would come forward and give an accurate and detailed account of their experiment.

Primary Batteries for Electric Lighting.

To the Editor of The Electrical World:

SIR: In your issue of Aug. 1 appeared a short account of some tests being made on primary batteries in Boston. I quote: "On July 7, at 12 M., a battery of nine cells was started at lighting two 8 candle-power lamps, six minutes on and six minutes off, day and night, the interruptions being accomplished by the aid of an ordinary 24-hour clock. This was continued until July 20, at ten o'clock A. M., when the lamps had been burning a total of 152 hours. The object of this arrangement was to get the 152 hours inside of 12 days, while in practice they would be spread over six weeks." A little further on we find that "the inventors, Messrs. Kauffer & Goldner, state that the work put upon the battery in the test described was harder than it would have been if running according to their original claim; four hours a day for a period of 38 days."

It is well that the inventors have told us this. Certainly no one in the light of the above account would imagine it to be true were he not told. It is seemingly as absurd as to say that because a Diamond carbon or Leclanché battery will work, one minute closed and one minute open, for, say, two hours without apparent deterioration, that it is a good practical battery for work in which it must be used one hour continuously; in other words, a battery that will work well on open circuit will work well on closed circuit. Indeed, according to Messrs. Kauffer & Goldner, it will work better in the latter case.

The point that I wish to bring out is that these Boston tests are such as might be, very appropriately, applied to open circuit batteries, and that the only true way to test a battery intended to work for three or four consecutive hours is to keep it closed continuously for at least as long a time as it would be in actual practice. I venture to say that the Diamond carbon or the Leclanché battery, the cells being properly coupled, would do nearly, if not fully, all that is claimed for the Kauffer & Goldner battery. Perhaps the inventors may be able to clear up this matter. Let us have light. JAS. F. KELLY.

NEW YORK CITY.

The Telephone in Mexico.

Discussing the situation in Mexico, the *Mexican Financier* makes the following observations: Mexican telephone stocks are now so far reduced in the public appreciation that they have lost all appearance of being serious investments for capital, This is not the fault of the active managers of the telephone in Mexico. The root of the trouble lies in the expensive management of these companies, of which eight are, at the present moment, operating in this country, all of them, we believe, duly provided with boards of directors, presidents, secretaries and treasurers, and all paying office rents in American cities. If there could be a consolidation of the companies effected, and the management concentrated in one general manager here in this metropolis, many important economies could be carried into effect. The several Mexican telephone companies are too heavy at the top. A mere enumeration of them is of interest, as showing to what a ridiculous extent this telephone apportionment of territory has gone in this country. First we have the Mexican Peninsula Company, controlling the States of Oajaca and Yucatan; next comes the Mexican Central Telephone Company, which controls the states of San Luis Potosi, Zacatecas, Aguascalientes, Queretaro and Guanajuato; also the Mexican Northern Telephone Company, which has the States of Nuevo Leon and Tamaulipas, with a general manager residing in the distant American State of New Jersey; then comes the Chihuahua & Durango Company, operating in those States; next we have the Pueblo Telephone Company, which operates in the States of Puebla, Tlascala and Hidalgo; then there is the Mexican Pacific Telephone Company, controlling the States of Sonora, Sinaloa and Colima; also the Vera Cruz Telephone Company, operating solely in the State of Vera Cruz, and lastly the Mexican Telephone Company, with headquarters in this city, and controlling the business of the city, state and federal district of Mexico, besides the State of Jalisco, the telephonic centre of which is Guadalajara. This is truly a formidable list for this country. The stockholders of these eight companies might have a better chance of securing a dividend if a consolidation could be brought about.

Plans for Underground Wires.

The Electrical Subway Commission met at the Metropolitan Hotel on the 10th inst., President Loew in the chair. Commissioners Hess and Moss were also present. Secretary Moss presented a number of letters which he had received since the last meeting of the board. One of them was from Norvin Green, President of the Western Union Telegraph Company. Dr. Green wrote that the company did not contemplate putting any more wires overhead, and that experts were examining the company's system in this city, so as to give their opinion as to how many of the Western Union wires could be placed under ground without destroying the business of the company. Dr. Green added that he would be glad to appear before the commission at any time which the board might appoint, and present the situation as to all the wire service in which the Western Union Company is interested.

Eugene T. Lynch, President of the United States Illuminating Company, wrote to ask permission to place poles and wires in Twenty-ninth street, from the East river to Third avenue, to take the place of poles and wires in East Forty-fourth street, which are to be taken down on account of the abandonment of the Forty-Fourth street station, made necessary by the enlargement of the Grand Central Station. Mr. Moss thought that the commission had no right to give authority to erect new poles on Twenty-ninth street if the people residing on that street objected, and after some little discussion among the Commissioners the matter was laid over until the next meeting.

A communication was received from the Metropolitan Telephone and Telegraph Company, accompanied by a map showing the lines of the company and the routes which, according to the experts of the company, it is practicable to put under ground. In this latter, which was signed by Mr. T. N. Vail, President of the company, the statement was made that not over 12 miles of telephone wires could be worked under ground. The letter was laid over for consideration.

Supt. Price, of the Baltimore & Ohio Telegraph Company, wrote a long letter, and inclosed a map showing the lines of the company in this city. "We desire to co-operate with the commission," he wrote. "Every telegraph man wants to see the wires under ground, so far as it is practicable to put them there."

Underground Conduits as Disease Breeders.

At the meeting of the Board of Health in Philadelphia on Monday last, Chief Inspector Martin submitted a report upon a complaint by a number of brokers and insurance firms in the vicinity of Third and Chestnut streets, in relation to the escape of gas at that point from the underground conduit on Chestnut street. The gas recently has become very offensive, producing sickness and headache. In his report the Inspector says that to prevent explosions which have occurred in the conduits, the company have a steam blower at their office, which is constantly at work forcing the gas out of the tubes which escapes through the terminals at Chestnut street and Third. This was done at the instance of the Mayor and Councils. The company have no effectual way of remedying the escape of the gas in this way, without incurring the risk of explosions, and the Inspector suggests that to strike at the root of the evil the Gas Trust be requested to find the leak in the main and stop it. The Chestnut street sewer is filled with the gas, and it can be noticed escaping through the inlets. The report suggests that open man-holes be placed at intervals along the line of the sewer, so that the gas can escape, and it will be less difficult to find the leak. The matter was referred to the Sanitary Committee.

The La Rue Telegraph Key.

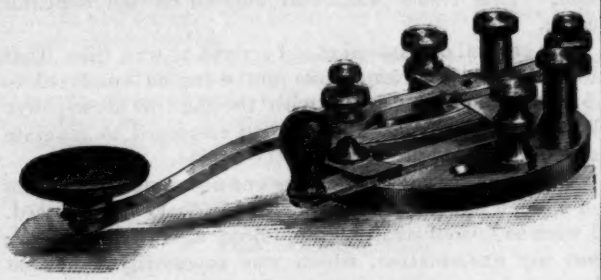
This telegraph key is a departure from familar forms, in substituting for the trunnions or pivots upon which the lever vibrates, a torsional spring or strip of metal, preferably spring steel made flat and thin to allow of a free torsional movement. This strip of metal is secured rigidly to the lever by two rivets and is kept firmly in its place on the side posts by thumb screws passing through the holes having a shoulder fitted perfectly into the holes of the strip. This arrangement is made in order that the lever and spring may be quickly and easily removed for cleaning the contact points or other purposes. The spring strip is stamped with a rib on one edge, similar to an envelope flap, and this with a small metal washer on the under side of the spring prevents any vertical movement of the spring.

The adjusting contact thumb screws serve the purpose of regulating both the amplitude of the lever movement and the retractile resistance of the torsion spring. By this arrangement the ordinary spiral spring to resist the downward movement of the contact lever is done away with. In ordinary telegraph keys a retractile spring is supplied to regulate the force required to depress the lever, as well as pivots or trunnions on which the lever vibrates. In the La Rue key the torsional spring not only takes the place of the pivots or trunnions, but, when used in connection with the adjusting screws, takes the place of the ordinary retractile spring.

The construction of the key is thus simplified by discarding two of the wonted features, viz., the trunnions and the retractile spring.

Among the advantages claimed for this key might be mentioned the following: There are no trunnions to work loose and wear out; there is no adjustment of trunnions, and there is no lost motion in the lever suspension. It cannot "stick." The lever movement vibrating by means of the torsional twist of a strip of metal, permits an exceedingly free and frictionless vertical movement, yet it is free from the slightest side or lateral action, preventing any "sticking," a point which will be readily appreciated by all operators. There is no retractile spring to break or get out of order. The adjustment for ease or rigidity of lever movement is accomplished wholly by the screws carrying the upper contact. The range of adjustment is very great, from that which the lightest movement of a lady's hand will operate to the heavy stroke of a beginner.

This key can be used as a self-closing key, so often



LA RUE TELEGRAPH KEY.

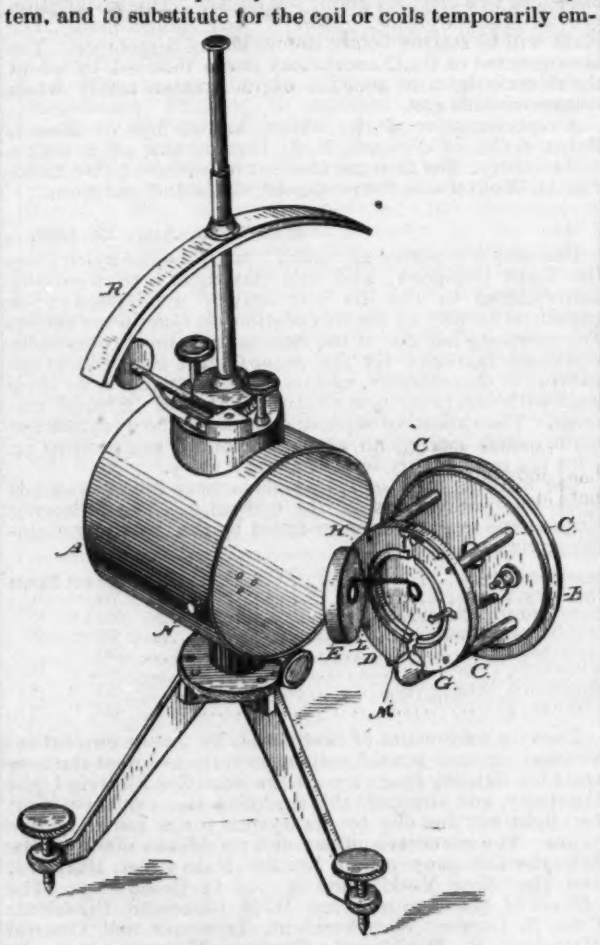
longed for on railroad lines, as it can be so adjusted as to close itself securely the very instant the lever button is released by the operator, thus preventing an open line.

Both contacts may be easily removed and replaced with new ones if necessary, thus making the key everlasting, as there are no other wearing parts.

The keys have been subjected to most severe tests by the Western Union, Baltimore & Ohio and Postal Telegraph companies, and high recommendations have been received from the superintendents, managers, chief operators and operators. The lever is made light, of the best steel, handsomely nickeled, and the material and workmanship are the best throughout. The key is fully covered by patents controlled by Messrs. Lytle & Co., 15 Cortlandt street, New York City, who will take pleasure in supplying any further information.

New Reflecting Galvanometers.

For various conditions of current to be detected or measured, it is frequently desirable to alter the astatic system, and to substitute for the coil or coils temporarily em-



NEW REFLECTING GALVANOMETER.

ployed another or others of greater or less resistance. Further, it is necessary that the coils should be removed or inserted as expeditiously and readily as possible, and that they should be easily and readily accessible. Their framework, moreover, should oppose no obstacle to the operation of hanging the suspended system, and should be so put as not to endanger the integrity of the latter by accidental closing during adjustment.

Mr. Robert J. Pratt, of Troy, has provided means for fulfilling these conditions. The accompanying cut represents the general construction, showing that the coils and suspended system are attached to and supported by the rack plate *B*, which is hinged to the main casing *A*, and adapted to be secured in position by a catch *N*. The front ring *E* is hinged to the framework *D*, below the horizontal diameter of the latter, so that it can be dropped down to one side, disclosing the suspended system. The peculiar position of the hinge prevents the ring from closing accidentally during the operation of adjusting the system. Another important feature of the galvanometer is that the coils are so located in the rings that they are adjustably removable. The galvanometer has been patented and made by the Electric Manufacturing Company, of Troy, N. Y., from whom further information may be obtained.

The Cowles Electric Furnace.

We have had occasion recently to call attention, says the *Iron Age*, to some tests made at the Otis Works, of some aluminium alloys produced by the Cowles Electric Smelting and Aluminium Company, of Cleveland, Ohio. These alloys are produced in an electric furnace, the details of which have been recently covered by patents. Attempts have heretofore been made to reduce ores and perform metallurgical operations by means of an electric arc, the material to be treated being brought within the field of the arc or passed or fed through it. It is stated, however, that numerous experiments have demonstrated that the arc system is not adapted for long and continuous operations on any scale of considerable magnitude. The difficulties attending the regulation of the arc and the maintenance of a constant resistance are very great, and the heat generated, though intense, is localized and difficult to control. The efforts of Messrs. Cowles have been directed toward securing a distribution of the intense heat which it is well known that electricity is capable of generating over a large area and through a large mass in such a manner that a high temperature can be sustained for a long time and can be controlled. With this object in view they use a body of granular material of high resistance, such as electric light carbon or charcoal, which they interpose within the circuit in such a manner as to form a continuous and unbroken part of it. The granular resistance material, by reason of its low conductivity, becomes incandescent and generates all the heat required, the ore being mixed with it. The operation is, of course, carried on in an air-tight chamber in a non-oxidizing atmosphere, the carbon acting as a reducing agent for the ore. The smelting chamber has sides and bottom formed by closely packed pulverized charcoal, the electrodes entering at opposite ends. The mixture of the ore to be reduced and of the resistance material form a core in the centre. Messrs. Cowles have devoted their attention chiefly to the reduction of aluminium, having a plant with Edison and Brush dynamos, capable of producing daily 40 pounds of 10 per cent. aluminium bronze. They are about to build a large plant, using water-power, which will have a capacity of 1 ton to 1½ tons.

Refining Sugar by Electricity.

In reply to many of our readers who are anxious for further information upon this subject, says the London *Electrician*, we publish the following statement, which has been forwarded to us by Mr. J. U. Robertson, 5 Baltic buildings, Redcross street, Liverpool, on behalf of the Electric Sugar Refining Company, of New York. This gentleman says: "Cable advices to myself and others in Liverpool have just been received from several gentlemen who were present at the demonstration of this company's process of refining sugar, which was given on the 15th inst., in New York, on a scale much larger than has heretofore been attempted. The result was most satisfactory, for in the short space of seven hours some 40 barrels of refined sugar were produced from a common grade or ordinary West Indian refining sugar, without making any sirup or soft sugars, the whole product being the highest grade of refined sugars, the analysis of which exceeds 99.50 per cent. cane sugar. The conditions upon which this demonstration was to be given (as per my letter advices received previously) were to be as follows: (1) Five to six tons raw sugar were to be refined at one time; the same to be carefully weighed and analyzed; the analysis to be by Prof. Chandler, of Columbia College, New York, who is a well-known public analyst. (2) The premises in which the machine stood to be thoroughly examined by the gentlemen present, to see that no sugar was there except the raw which had been brought to be refined; every precaution to be taken to see that no communication from without was possible. (3) This done, they should certify the same in writing, and then the work of refining would commence and continue, they being in and around the premises during the time occupied. (4) The inventor undertakes, as a condition of the demonstration, to return them refined sugar of such sizes as they may designate before the demonstration, and to give them in weight of refined sugar within one per cent. of the weight of the entire saccharine matter in the raw sugar, including glucose or invert, as shown per the analysis of Prof. Chandler, and he also undertakes that the said refined sugar will analyze not less than 99.50 per cent. cane sugar. (5) These things being performed, the demonstration was to be considered conclusive and satisfactory in every particular. The reason for giving this demonstration, which is one of many, is to secure from the sale of shares the balance of the capital required to complete the machinery and put it into operation, and I am advised that sufficient have been contracted

for pending the demonstration, to furnish that, including a small number of shares which have been placed in my hands for that purpose. I am also advised that the machinery to refine 500 tons of sugar per day of twenty-four hours is far advanced in its construction, and will now be pushed forward to completion. Mr. Robertson adds that he will be happy to supplement this information if desired, and also to show samples of the sugar produced by the company's process.

The Triple Thermic Motor.

The following report has now been given out as that of Mr. John Trowbridge, Professor of Physics at Harvard University. It is dated June 26, 1885. We print it in full, as an important contribution to the discussion now being waged so hotly over the merits of the new motor. He says:

The tests of the efficiency of the triple thermic motor at Lowell made by me were as follows:

1. Estimate of the size of the boiler used to heat the water vapor (which was in turn employed to generate the bisulphide of carbon vapor) and of the work the engine was doing.

2. Measurement of the temperature of the bisulphide of carbon as near its point of entrance into the cylinder of the engine and as near its point of exhaust as possible. This measurement was made in order to obtain an idea of how much of the heat of the vapor was transformed into work.

3. Measurement of the electrical work the engine, working by bisulphide of carbon vapor, was doing under the conditions of 1 and 2.

In regard to 1, my tests were necessarily general estimates. The boiler which generated the steam, which was in turn employed to heat the bisulphide of carbon, was rated at about a 30 horse-power boiler.

The grate surface was 54 inches by 42 inches.

Length of the boiler, 12 feet.

Number of tubes, 41.

Thickness of iron, $\frac{5}{16}$ of an inch.

Shell, 42 inches.

Size of tubes, 3 inches.

The pressure of steam varied from 60 to 65 pounds on the steam gauge.

The size of the engine was 14 × 28 inches.

Rated at 60 horse-power at 80 pounds pressure.

Cubical contents of steam cylinder, about 4,284 cubic inches.

The size of the boiler was manifestly too small to enable the engine to do the work it was shown to be doing by the tests 2 and 3, if it was worked by steam alone, at the pressure of 60 or even 80 lbs.

IN REGARD TO 2.

Ten sets of measurements of temperature were made and ten indicator cards were taken with the full load of from 60 to 70 Thomson-Houston arc lights.

The average temperature of the bisulphide vapor at the throttle was 275 degrees Fahrenheit, and at the exhaust 120 degrees Fahrenheit.

Employing the thoretical law that the amount of heat transformed into mechanical work is to the total amount of heat in the vapor as the difference between the higher and lower temperature is to the highest temp rature, we have: H = amount of heat transformed into mechanical work = $T - T1 \div H1$, in which T and $T1$ are the higher and lower temperatures reckoned from absolute zero.

This formula gives an efficiency of about 20 per cent.

The ordinary steam engine working under similar conditions would give an efficiency from 10 to 15 per cent.

With regard to the test of the electrical work, the following report is given:

Each dynamo was connected on separate circuits exterior to the engine room. The dynamos and engine were connected by belting to a shaft. During the test all the machines were running. Indicator cards were taken at the same time that the electrical tests were made. The currents were tested by a Sir William Thomson ammeter. The instrument was connected to the circuit at the commutator, placed near the machines in the engine-room.

The electromotive force was tested by one of Sir William Thomson's voltmeters, which was connected as near the machine as possible.

The following gives the result of the observations:

DYNAMO NO. 1.

Magnetometer position 16. Deflection 12.5.
Strength of field 10.9818.
(12.5) (10.9818) = 8.57 ampères.

16

Magnetometer position 1-16. Deflection 13 (average of ten observations).
Strength of field 8.8018.
(13) (16) (8.8018) = 1830.7 volts.

DYNAMO NO. 2.

Magnetometer position 16. Deflection 12.
(12) (10.9818) = 8.32 ampères.

16

Electromotive force same as No. 1—1830.7 volts.

DYNAMO NO. 3.

Magnetometer position 32. Deflection 25.
(25) (10.9818) = 8.58 ampères.

32

Electromotive force same as Nos. 1 and 2—1830.7 volts.

DYNAMO NO. 1.

Current 8.57 ampères.
Electromotive force 1830.7 volts.
Energy consumed = (8.57) (1830.7) = 21.03 horse-power.

746

DYNAMO NO. 2.

Current 8.23 ampères.
Electromotive force 1830.7 volts.
Energy consumed = (8.23) (1830.7) = 20.10 horse-power.

746

DYNAMO NO. 3.

Current 8.58 ampères.
Electromotive force 1830.7 volts.
Energy consumed = (8.58) (1830.7) = 21.05 horse power.

746

Dynamo No. 1	21.03	horse power.
" " 2	20.10	" "
" " 3	21.05	" "
	68.18	" "

The engine was therefore doing 62.18 horse-power work, not counting consumption of power by belting and friction. This result was corroborated by the indicator cards.

The general conclusion that I arrived at was this: That it would have been impossible for the engine employed to do this amount of work with the shell 30 horse-power boiler employed, if this had been employed to generate steam to be used directly with the engine.

With a better engine than the one now employed, I am of opinion that a still higher efficiency could be obtained. I went to Lowell strongly prejudiced against the motor; but my examination, which was necessarily somewhat hurried, impressed me highly with the success of the experimental station which the motor company have established at Lowell. I was given every facility for examination.

(Signed) JOHN TROWBRIDGE.
Professor of Physics, Harvard University.

Close of the Bartholdi Statue Pedestal Fund.

The New York *World* having raised more than the $100,000 that it set out to collect, for the erection of the Bartholdi Statue Pedestal, it has closed the fund. On the 11th inst. it printed in full our last auxiliary fund list, remarking: "We have $65 to-day that came through THE ELECTRICAL WORLD. This makes about $300 that we have had through that enterprising journal." Editorial reference to the subject is made in this issue, on page 61.

NEW ENGLAND NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
BOSTON, Aug. 13, 1885.

The Edison Company for isolated lighting have just closed a contract with the New England Conservatory of Music, in this city, for about 900 lights. This installation provides for the entire lighting of the establishment. The plant will be started before the middle of September. The management of the Conservatory were induced to adopt the electric light on account of its greater safety when compared with gas.

A representative of the widely known firm of Messrs. Baker & Co., of Newark, N. J., favored this office with a call recently. The firm are familiar to readers of THE ELECTRICAL WORLD as refiners of gold, silver and platinum.

HARTFORD, Aug. 12, 1885.

Business is reported as "good" with the Schuyler Electric Light Company, and this statement is substantially corroborated by the life and activity manifested at the capacious factory of the corporation on Commerce street. The company has one of the largest and most completely equipped factories for the manufacture of electrical apparatus in this country, and its facilities enable it to keep pace with orders for new electric plants and lighting stations. The extensive department where the dynamos are made covers nearly an acre of ground, and is fitted up with the most highly improved machinery.

The working force of 175 people is busy filling demands upon the productions of the company. The following plants have recently been installed by the Schuyler Company, viz.:

Marlboro, Mass	60	arc lights
Danbury, Conn	75	" "
New Britain, Conn	135	" "
Middletown, Conn	75	" "
Holyoke, Mass	150	" "
Knoxville, Tenn	90	" "
Allentown, Penn	30	" "
Chicago, Ill	80	" "

The city authorities of Richmond, Va., after careful investigation and consideration, recently awarded the contract for lighting that city to the Schuyler Electric Light Company, and also gave this company the exclusive right for lighting the city by its system for a period of five years. The executive offices and president's office of the Schuyler Company are at No. 220 Main street, Hartford, and the New York office is No. 44 Broadway. The officers of the company are H. M. Cleveland, President; Chas. E. Dustin, Vice-President, Treasurer and General Manager; H. M. Linnell, Business Manager; Geo. R. Williamson, Secretary.

Mr. Dwight Slate, manufacturer of special machinery and machine tools, No. 262 Main street, has perfected and is making in large quantities a variety of tools specially adapted to the manufacture of electrical apparatus. Mr. Slate is alive to the requirements of electrical industries, and it is his intention to cater to that trade in the future. He is familiar with the class and quality of tools necessary to make the finest grades of electrical goods, having had considerable experience in this line. He has manufactured a good many experimental dynamos and other apparatus for inventors and amateurs, and has for some time past made electric lamps in quantities according to specification for several electric light companies.

Messrs. H. B. Beach & Son are making a very fine line of tubular boilers, with addition of a patented "water front." This valuable adjunct to the boiler makes it easier to fire, is self-cleaning, and entirely obviates repairs to front end of the furnace.

The Mather Electric Company is very much encouraged over the popularity and success of its system wherever it has been introduced in various sections of the country. This company has installed numerous plants throughout the United States and Canada, and also some in foreign countries. In every case its system has given satisfaction. This company is the sole manufacturer, under all the patents of Richard H. Mather, for electric lighting and transmission of power; also sole manufacturer, under all the patents of Charles G. Perkins, for incandescent lamps and appliances for incandescent lighting. The Mather dynamo for incandescent lighting is self-regulating, and will burn from one lamp to full capacity of machine without change of speed, and without the use of any apparatus outside the machine. The factory and business offices of the Mather Electric Company are at No. 133 Sheldon street, Hartford, and executive offices at Manchester, Conn. It is gradually increasing its business, which has been built up to its present favorable condition on the merits of the system. Recently it installed a plant at the Providence Worsted Mills, Providence, R. I., of 250 incandescent and 30 arc lights; also a plant in the worsted mills of Aldrich & Milner, Moosup, Conn. It is now installing a plant of 750 incandescent and 70 arc lights at the establishment of Messrs. H. B. Claflin & Co., in New York City. This company manufactures everything pertaining to its systems of arc and incandescent lighting at its own factory.

Messrs. N. Palmer & Co., No. 302 Asylum street, make a superior grade of oak-tanned leather belting. They already have numerous patrons among the electrical industries.

The Baltimore & Ohio Telegraph Company has recently established very nicely fitted up offices in this city, near the post office, at No. 280 Main street. The manager of this office is Mr. J. E. Pucci, formerly manager of the American Rapid Telegraph Company, and with that company when it first started in this city, and afterward manager of the Bankers & Merchants' Telegraph Company's office, also in this city. The Baltimore & Ohio Telegraph Company has lately established offices in New Haven, Meriden and Middletown, its aim being to open up connections throughout New England as rapidly as line facilities can be obtained.

Messrs. T. Sisson & Co., No. 259 Main street, make a specialty of machinery oil, and are desirous of cultivating a trade with the electrical people.

WESTERN NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
CHICAGO, Aug. 13, 1885.

The Electric Light Convention of Aug. 18 is looked forward to with a good deal of interest by people out this way, and the indications are that there will be quite a good many Western people in attendance. People in this section look upon the convention as a sort of Western institution any way, in as much as the first meeting was held in Chicago, and inasmuch as the efforts of Western men contributed very largely to the success of that meeting and to the final outcome of the matter in the shape of a national electric light association.

From the data which Mr. George S. Bowen has at hand, it would seem that the convention is to be a very decided success, and that some very interesting papers will be read before it. The following Western people have already signified their intention of being present: Mr. M. C. Bullock, of the Bullock Manufacturing Company, Chicago; Messrs. Stiles, Bowen and Van Depoele, of the Van Depoele Co., Chicago; Mr. Sperry, of the Sperry Electric Light Co., Chicago; Mr. F. S. Terry, of the Electrical Supply Co., Chicago; Mr. A. L. Ide, of the Ide Engine Works, Springfield; Mr. Parker, of the Parker-Russell Carbon Co., of St. Louis; Mr. Fauré Bain, of the Bain Electric Co., Chicago; Mr. Norcross, of Janesville, Wis., and Mr. Officer of Council Bluffs. The train bearing these people, and probably quite a number of others, will leave Chicago Sunday morning, Aug. 16, going to New York over the Grand Trunk and West Shore roads.

KANSAS CITY, Aug. 12, 1885.

The Edison Electric Light Co., through its general agent, Mr. W. Preston Hix, of St. Louis, has just finished putting up an incandescent plant in the "Coates House," this city. This is the first work done by this company in Kansas City, and this is our first introduction to the incandescent system. If it proves successful, a local company will be formed with sufficient capital and energy to boom this company's light in general and the incandescent system in particular in other parts of the city.

The Missouri and Kansas Telephone Company have recently added their seventh multiple switchboard, bringing up their capacity to 1,400 subscribers. They have now about 1,200, and are increasing at the rate of three per day. Who can beat this? This company has also just finished a toll line to Liberty, Mo. They use cedar poles and paper insulators, 14 copper wire and insulated tie wires. There is considerable telegraphic induction on this line, owing to too close a proximity to the wires of the Western Union, but General Superintendent Smith says he can counteract this by using an insulated wire inclosed in a lead casing and grounding this outward covering at frequent intervals. By the way, Mr. Smith and his electrician, Mr. Barrett, are now busy experimenting on a new and simple plan of doing away with induction (of whatever kind) altogether. I have had a glimpse of the apparatus and was offered some shares of stock in the enterprise, but there are so many multiple board and conduit patents lying undeveloped about this office that I am getting skeptical about anything in the nature of an electrical bonanza.

It is now generally understood that we are to have a first-class electrical supply company in Kansas City in the near future. Both local and outside parties are moving in the matter. A prominent Eastern firm will send a representative here next week to look the city over, and we are confident that as soon as he lands in our midst, he will decide to move his plant and business to our city.

The employés of the Kansas City Telephone Exchange had their "first annual moonlight picnic" August 1. They went by steamer from the foot of Main street, and after spending four or five hours at the Inter-State Fair Grounds, returned in the wee sma' hours via Merriam Park. The "Hello" girls made great preparations for this event, and it was enjoyed by everybody participating.

THE TELEGRAPH.

Old Timers.—Those who desire to join the Old Timers' Association will be assisted to do so on applying to Mr. J. H. Bunnell, 106 and 108 Liberty street, or Mr. W. P. Phillips, United Press, 187 Broadway, or on W. J. Johnston, 9 Murray street, from each of whom information on the subject can be obtained.

A Telegram No Ground for Arrest.—Joseph Harris, who was arrested in Chicago recently for alleged connection with the Detroit Bank robbery in 1880, was subsequently released on a writ of habeas corpus by Judge Anthony, who held that there were no grounds for his arrest except a telegram, whereas an affidavit was necessary.

Extending Connections.—The Atlantic Telegraph Company has just concluded an important contract with the Mackey-Bennett system of ocean cables by which it secures connection with London, Liverpool, Glasgow, Manchester, Paris, Havre, Berlin, and all points in Great Britain and Europe, and also points in India, Africa, Asia and Australia. The contract will enable the Atlantic company to compete with the Western Union on this class of business.

New York and Yonkers.—The certificate of incorporation of the New York Auto-Telegraph Company was filed August 5 in the office of the County Clerk. The lines of the company are to run from Battery place and Broadway to the building of the United States post office in Yonkers. The capital stock of the company is $2,000,000, divided into 20,000 shares of $100 each. Its corporators are Henry Van Schaick, Robert D. Radcliffe and Augustus T. Gillender.

The Cost of Litigation.—In the Supreme Court of this State judgment was recently obtained by James H. Goodsell against the Western Union Telegraph Company for $240,159.11, for alleged failure to account for money collected for Mr. Goodsell and breach of contract. An order was granted by Judge Ingraham giving an extra allowance of $1,500 to Messrs. Miller & Savage, the plaintiff's counsel. The papers show an additional expense also saddled on the Western Union of $2,200 referees' fees and $750 stenographer's charges, all of which will compel the telegraph company to increase its check for damages to nearly the round figure of $245,000. This, of course, does not include its retaining fees to counsel and other legal expenses.

Co-operative Operators.—A number of telegraph operators of St. Paul, Minn., are reported to have incorporated the Operators' Telegraph Company, with a capital stock of $10,000,000. It is intended by those who have the new project in hand to extend the wires of the new company all over the country, and to compete with the Western Union Telegraph Company. The design is to make the company co-operative, and it is intended to enlist all the operators in the United States in the enterprise. It is claimed that stock to the amount of $100,000 has already been taken, and the work of construction will be at once begun as soon as $500,000 worth of stock has been subscribed for. The first line built will be from St. Paul to Chicago. It is thought that the requisite amount can be secured in six months' time, and that by spring the work will be prosecuted with vigor.

"Telegraphic Determination of Longitudes."—This volume, recently published by Capt. J. G. Walker, U. S. N., Chief of the Bureau of Navigation, is a valuable contribution to American geography. The telegraphic determination of longitudes has been, since 1874, carried on by the Navy Department. In the present volume the results are in part given, showing longitudes in Mexico and Central America, and on the west coast of South America, embracing the meridians of Vera Cruz, Guatemala, La Libertad, Salvador, Paita, Lima, Arica, Valparaiso and the Argentine National Observatory at Cordoba, with the latitudes of the several sea-coast stations. The importance of this work for hydrographic and nautical ends is very great, and the labors of Lieutenant-Commanders Green and Davis and Lieutenants Norris and Laird, through whom the measurement of longitude differences was made, must have been considerable.

Telegraph Capitalists.—No one, to see the Bonanza King, John Mackay, lounging about the Hoffman House, would take him to be the celebrated personage he is, unless the observer was a student of character, and then the strong, prominent brow, the indomitable nose, the speculative, thoughtful eye, and the persevering and determined chin of the face would mean something to him. He is alert in his manner and exceedingly neat in his dress. Harry Rosener, who has charge of all of Mackay's telegraph interests, is a medium-sized, bearded man, who moves about quietly but seriously. Rosener kept a small store in Virginia City and sold some fancy needle-work for Mrs. Mackay when she was a poor widow, just before her marriage to Mackay. When she married Mackay that gentleman became a great friend of Rosener and the latter soon gave up his little shop and went into mining speculation, and now is quite wealthy.—*N. Y. World.*

Poles in Syracuse, N. Y.—The pole troubles in Syracuse, N. Y., have not yet come to an end. A dispatch from that city, dated August 8, says: On Thursday night workmen of the Baltimore & Ohio Telegraph Company erected a large pole in front of the company's office on South Salina street. It was subsequently cut down by the police under directions from the Mayor, who said the company had not obtained permission for its erection from the Common Council. Friday the company served an injunction on the city restraining it from interfering with its property, and erected two more poles. Later the City Attorney persuaded the judge who issued the order to modify the injunction, and the Mayor again ordered the poles taken down. One was lowered last night, and the workmen were about to fell the other when the attorneys representing the city and the company agreed to postpone further action until the case is argued before Judge Kennedy.

Wheatstone and Palmerston.—The encounter which amused me most occurred at an evening party at the Vice-Chancellor's. Lord Palmerston was one of the eminent men who had received his degree in the morning, and, standing at a little distance, I watched him as he listened to a somewhat prolonged exposition by Prof. Wheatstone of certain new devices he had been busied with for the application of telegraphy. The man of science was slow, the man of the world seemed attentive; the man of science was copious, the man of the world let nothing escape him; the man of science unfolded the anticipated results—another and another, the man of the world listened with all his ears; and I was saying to myself: "His patience is exemplary, but will it last for ever?" when I heard the issue: "God bless my soul, you don't say so? I must get you to tell that to the Lord Chancellor." And the man of the world took the man of science to another part of the room, hooked him on to Lord Westbury, and bounded away like a horse let loose in a pasture.—*Sir Henry Taylor's Autobiography.*

The Canadian Pacific Telegraph.—A dispatch from Montreal says: It is expected that in the course of a month the telegraph system of the Canadian Pacific Railway will be thrown open to the public. "Our system is now in first-rate condition," said an officer of the road, "but we do not desire to open it to the public until we are in a position to give ample satisfaction, and at the same time to dispatch gangs of men to any portion of the line to carry out repairs." In telegraphic circles here it is known that the most gigantic efforts were made by Jay Gould on behalf of the Western Union to get control of the Canadian Pacific lines. This was peremptorily refused, and negotiations are believed to be on foot for the laying of a cable to connect the Canadian Pacific system with Australia, China and Japan. The Dominion Government has in fact been approached on the subject by an English capitalist, but with what result has not been learned. A gentleman who is well posted in telegraph matters stated to-day that the Canadian Pacific had a complete monopoly of the business west of Winnipeg, and no doubt had valuable connections with the adjoining Republic, probably over the Vanderbilt system of railways, with whom the company was on the best of terms.

THE TELEPHONE.

Excursion.—The annual moonlight excursion down the Bay, given to its employés by the New York & New Jersey Telephone Company, takes place next week. This is one of the most enjoyable events of the season, and we hope good weather will be granted for it.

Sad, if True.—The London *Electrician* of July 31, says: The death is announced of Mr. Gower, inventor of the telephone which bears his name. Mr. Gower left Cherbourg on the 18th inst. in a balloon, for the purpose of carrying out some experiments having for their object the perfection of a device for obtaining automatically a desired equilibrium of the balloon at different altitudes. The balloon, however, descended when some distance at sea, and the unfortunate gentleman, after floating for many hours, ultimately died from cold and hunger. The balloon was found by some fishermen several miles from Dieppe.

Swedish Telephonic Associations.—News comes from Sweden that a mutual association to work the telephone has been formed in Gothenburg, Sweden, a town of 80,000 inhabitants. The charges are about $13 per annum for a radius of nine miles. There are now 600 subscribers and about 2,000 calls daily, and even at the low rate charged the institution has established a reserve fund. In the same town there is another company, the Bell Company, which has also 600 subscribers and about 3,000 calls daily; the charge is about $22 per annum. Much smaller towns than Gothenburg have their mutual telephonic associations, which work well and cheaply. The State owns the telegraph, but no hindrance is offered to the telephones, and no royalties are charged.

A Manchester Scheme.—There is a plan on foot in Manchester, England, to supplant the existing telephone company (the Lancashire and Cheshire) upon the expiration of its patent rights in 1890. A committee has been formed in Manchester and Liverpool, which will issue the prospectus of the "Co-operative Telephone Association" in January, 1888. It is computed that 4,000 subscribers will immediately be obtained, and provision will be made for 5,000. Nearly all the Manchester subscribers to the Lancashire and Cheshire exchange are either buyers or sellers of cotton, and the assistance of most of these is anticipated. Something like an attempt to "boycott" the Lancashire and Cheshire company will then be made. Fifty thousand pounds is to be the capital, and interest at the rate of 5 per cent. is to be paid thereon. We would remind these sanguine schemers, says the London *Electrical Review*, that it is quite possible there may be a prolongation of the Bell patents, when the execution of their benevolent intentions will be unavoidably delayed.

The Van Rysselberghe System.—In consequence of certain unforeseen difficulties in connection with the Van Rysselberghe system, the French Government still hesitates to adopt it generally. Some experiments by M. Tommassi have therefore been authorized. M. Tommassi has just proposed a solution, which seems very promising from all points of view: he intends to diminish the current strength, and consequently the inductive effects. For this purpose he constructs an extremely sensitive relay, which he places near the telegraphic receiving instrument, and he can thus considerably reduce the number of elements composing the battery. Between Paris and Nantes, 425 kilometres, the battery usually employed for Morse or Hughes instruments consists of 70 elements. Upon this same line the Tommassi relay requires only five elements with the Morse and 10 with the Hughes. Over a distance of 615 kilometres, the same relay worked the Morse with six elements and the Hughes with 11, while these receivers ordinarily require 125 elements. The induction from the telegraphic current will thus be sufficiently reduced to allow clear telephonic transmission.

THE ELECTRIC LIGHT.

Baltimore, Md.—The Brush Electric Company, of Baltimore, is putting in a Ball automatic cut-off engine in its central station, to run the day circuit.

The Electric Light Discourages Lovers.—Since the introduction of electric lights at Bar Harbor the number of wedding engagements made there has perceptibly decreased.

Philadelphia Post-Office.—It is suggested that an effort be made to save money by replacing arc lights in the Philadelphia post-office by large incandescent lamps. The matter is being investigated by an official from the U. S. Treasury Department.

Electric Light Works Burned.—The Royal Electric Light Company's works and Nutter's box factory, on Dowt street, Montreal, were burned on the 29th ult. The Royal Electric Light Company were insured for about $50,000 on machinery and stock. Their machinery for manufacturing dynamos was all destroyed, but the running apparatus was only damaged by water. The total loss is estimated between $25,000 and $30,000.

The Fuller-Wood at Meriden, Conn.—The Fuller-Wood Electric Light Company, of Meriden, Conn., Mr. E. F. Fitzgerald, Manager, has 45 arc lights now running. It has just put in a 75 h. p. engine and two 50-light dynamos to run direct from the engine. This will give them 100 additional lights. The service is reported to be giving great satisfaction.

For the District of Columbia.—The Washington Excelsior Electric Light Company, of Washington, D. C., was incorporated under the laws of West Virginia, July 22, 1885, with Hon. J. F. Dezendorf, of Virginia; D. C. Forney, of Washington, D. C.; Hon. E. John Ellis, of Louisiana; Hon. Charles M. Shelly, of Alabama, and A. C. Dezendorf, of Virginia, as incorporators; capital, $1,000,000. Object—to manufacture artificial light by electricity for District of Columbia.

New Orleans.—A dispatch of August 8, from New Orleans, says: "The part of this city corresponding to Brooklyn, and which is known as Algiers, on account of the piratical nature of its early inhabitants, and all of the rear wards of the city, are without gas. The oil lamps with which they have hitherto been lighted have been a delusion. Many posts were knocked down by the cows, and the lamps of those standing were seldom lit. During the last few nights a considerable portion of these parts of the city has been brilliantly illuminated by the tower system of electricity, similar to that in Union Square, New York. There is a demand that the entire city be given up to electricity. This is not improbable, as nearly one-half is so illuminated to-day."

Lighting Extraordinary.—Railroad men have recently been considering the feasibility of using the electric light for headlights to their engines, and for the purpose of generally illuminating trains. The difficulty in the way seems to be that the jar in the locomotives and coaches is liable to cause uncertainty in the continuity of the light. But there is one method that does not appear to have been discussed to which this objection will not apply. That is, utilizing the existing telegraph poles and wires for the purpose of making a continuous illumination along the railroad tracks. There are thirty telegraph poles to the mile, and if on every other one of these were hung an electric lamp, the entire track could be made as light as day. This would do away entirely with the need of the expensive and cumbrous headlights, and, to some extent, with the necessity for using oil-lamps in the train. It would also obviate all the dangers to railroad traffic that are now incident to the darkness. Accidents resulting from washouts, or fallen trees, or landslides would be things of the past. Obstructions placed by malicious persons on the tracks would be seen at once, or, were the malefactors to take the precaution of cutting the wires before attempting to wreck the train, that would at once extinguish all the lights within the circuit, and give warning to the train officers that danger was ahead. Moreover, suppose the case of a train dispatched on mistaken orders, as soon as the case was discovered, the operator at the battery could, by a simple movement of the hand, extinguish the lights, which would be a signal for the train within his circuit to come to a stand and wait for orders. It may be urged against the suggestion that some of the lamps might get out of order and remain so, unless a close and expensive system of supervision were maintained. This difficulty can be met with further suggestion that, by a simple system of lettering and numbering the lamps, the engineers of passing trains could report to the next station what particular lamp or lamps might happen to be out of order. At any rate, the plan, which has been suggested by a practical railroad man of great experience, presents so many points of apparent advantage that it must be worth examination. To the public at large it would certainly give a greater feeling of security than is possible under the present system; and if the economical questions connected with it can be satisfactorily adjusted, it would undoubtedly be considered a large step in advance."—*St. Louis Globe-Democrat.*

APPLICATIONS OF POWER.

Antwerp Exhibition.—An electric tramway, operated by a Siemens plant, conveys visitors from the railway station to the Exhibition buildings.

Blackpool, England.—The Holroyd-Smith electric tramway system at this watering place has gone into operation very successfully on the line of route so far available.

In German Mines.—The Zankerode electric railway being a success, Messrs. Siemens and Halske have now put down another road for the Paulus-Hohenzollern collieries in Upper Silesia. The line is 800 yards in length, with a traffic capacity of 500 tons of coal in ten hours, at a speed, loaded, of 7½ feet per second. The generator is 250 yards from the track. The electric conductor runs overhead.

MISCELLANEOUS NOTES.

Lightning Freak.—Two boys, named Marco and John Garret, of Cohoes, were out in a thunderstorm Saturday, both under one umbrella, and the former was struck by lightning and killed, but the other, who carried the umbrella, was uninjured.—*Oswego Times.*

Cutting Glass Tubes.—Electricity has now been applied for cutting glass tubes—an operation of some difficulty when the diameter is large. The *Journal of the Society of Arts* says: "An iron wire, half a millimetre in diameter, is wound round the tube at the place required to be cut, and the ends are connected by means of copper conductors of the same diameter, with the poles of a powerful battery or other generator of electricity. This iron becomes heated when the current flows, and it is only necessary to cool it suddenly with a few drops of cold water in order to produce a clear cut. Glass tubes 4 inches in diameter are now cut in this way."

An Electro-Amalgamator.—This is another of the new appliances for the saving of gold exhibited in England at the Inventories Exhibition. As described in the *Journal* it is an invention for extracting gold from its ores under the influence of electricity. The pulverized ore containing

the gold is washed direct from the stamps over the simple and well-known form of amalgam-plate and riffle-table. An electric current is then to be maintained and applied to the copper plates and to the surface of the quicksilver in the riffles for keeping it bright and lively, and to prevent its becoming foul on the surface or covered with an oxide, and becoming sickened or floured. The quicksilver on the plates and in the riffles absorbs the gold more readily under the influence of electricity. By the use of this invention the production of gold is increased at a nominal cost for the electricity. There is a large field of usefulness for this and other gold-saving appliances, and the peculiarity of this invention of electrifying the quicksilver and keeping it bright will give a better opportunity for saving much of the fine gold that has heretofore escaped through not being brought into contact with the mercury.

Protection Against Lightning.—Mr. Calladon recently, addressing the French Academy of Sciences, said that there was no truth in the popular supposition that a building with a metal roof, or with metal in its construction, is more likely to be struck by lightning than a building composed wholly of non-conducting materials, providing there is no means of electric communication between the metal and the earth. A house in Neufchatel, Switzerland, had been struck by lightning and burned, and somebody suggested that a lot of old iron stored in the attic had attracted the electric fluid. It was this suggestion that brought Mr. Calladon to his feet. He said that the iron had had nothing to do with attracting the lightning, but had probably been a cause of the burning of the building after it had been struck. The explanation of that is that a combustible substance placed between two conducting surfaces (in this case the humid atmosphere and the pile of iron) is generally sure to take fire when an electric current is passed through it from one conducting surface to the other. The lightning having struck the house, concludes the scientist, it found its way to the metal within and ignited whatever combustible material it passed.

BUSINESS NOTICES.

Anti-Magnetic Shields for Watches.—These shields, made by Giles, Brother & Co., State and Washington streets, Chicago, are an efficient protection to the works of watches from magnetism, as many testimonials in their possession show. This firm also demagnetize watches that are already affected.

A New Departure.—The Stout-Meadowcroft Company, of 21 and 23 Ann street, with factory at 82 and 84 Fulton street, this city, agents for the Edison Lamp Company and for the insulated wires of Phillips Bros., of London, are now pushing business actively. They manufacture and deal in a large line of electrical supplies and specialties, and invite correspondence. Their experience and facilities enable them to fill the largest orders promptly and satisfactorily.

Dean's Rheumatic Pills
Are a sure cure, a superior remedy, almost infallible; 50c.
HALE'S HONEY, the great cough cure, 25c., 50c. and $1.
GLENN'S SULPHUR SOAP heals and beautifies the skin; 25c.
GERMAN CORN REMOVER kills corns and bunions; 25c.
HILL'S HAIR AND WHISKER DYE, black and brown, 50c.
PIKE'S TOOTHACHE DROPS will cure in one minute; 25c.

STOCK QUOTATIONS.

Telegraph, telephone and electric light quotations on the New York Stock Exchange, Boston Exchange and elsewhere are as follows:

Telegraph.—Am. Dist., b 17, a 22; Am. Cable, b 64½, a 65½; B. & M., b 2; Western Union, b 69½, a 69¾.

Telephone.—Am. Bell, b 203, a 204; Erie, b 26, a 26½, Mexican, b 1, a 1¼; New England, b 34½, a 34¾; Tropical, b 1, a 1¼.

Electric Light.—No new quotations.

OUR ILLUSTRATED RECORD OF ELECTRICAL PATENTS.

PATENTS DATED AUGUST 4, 1885.

Fire-Alarm Telegraph-Box; Frank F. Loomis, Akron, O..... 323,435

The objects of the invention are, first, to wind up and release the clock-work when the alarm-box is opened, which shall then continue to actuate the circuit-breaker until the alarm is repeated a number of times; and, second, to throw the box into circuit as the clock-work is wound up, and cut it out as soon as it ceases to repeat the alarm.

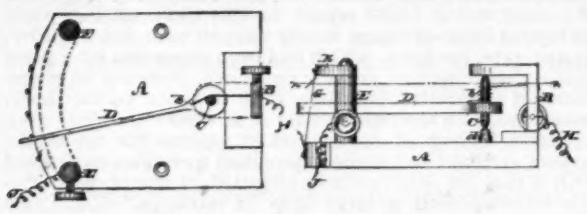
The combination, with a circuit-breaker actuated by a weight through a train of gearing, of a swinging lever, having at one end a segmental rack meshing into a winding pinion, and a latch at the other, and a pivoted bent lever adapted at one end to engage the latch, and having the other connected with the box-door.

Electro-Dynamic Motor; Frank J. Sprague, New York, N. Y., Assignor to the Sprague Electric Railway & Motor Co..... 323,460

1 2 are line-conductors, from which the motor derives current. 3 4 are the motor-circuit terminals. *A* are the main or regular field-magnet coils. *C* and *C'* are the two sets of differential field-magnet coils. 5 is the point of junction of the shunt-coil to the two sets of series coils. *D* is the armature. It will be seen that both differential sets are in series with the armature, while the main field-coils are in shunt relation to the armature and the differential coils *C'*.

Cut-out for Dynamo-Electric Machine; Charles J. Van Depoele, Chicago, Ill..... 323,470

The remaining coils of the armature—those not feeding the consumption-circuit—are represented by a second and usually smaller commutator, upon which bear brushes *M M'*, from which lead two circuits, one including the field-magnet coils only, and a second represented by the conductors *N O*, which pass directly to the box *B* and through suitable binding-posts to the contact-bars *F G*, which are so disposed that when the lever *D* is depressed



323,822. LIGHTNING ARRESTER.

they are separated, and the branch circuit, which, when closed, forms a short circuit around the field-coils, is broken.

Furnace for Baking Incandescents; Charles Coultass, Sharpsburg, Assignors to the Empire Electric Carbon Co., Pittsburgh, Pa..... 323,500

Provides an oven capable of receiving an equable temperature throughout; and to combine a series of ovens, each of which is heated from the same source, and is exposed to heat equally with the others.

Electric-Lamp Insulator; John R. Fletcher, Dayton, O., Assignor of one-half to Joseph E. Lowes, of same place..... 323,504

Relates to improvements in electric-lamp insulators adapted to the suspending of electric lamps from cables, gas-pipes, etc., and it consists of a metallic frame with hook at the lower end and eyes in the upper ends for a bolt, upon which is placed a cylindrical piece of rubber, and over which is placed a cylindrical piece of porcelain with a peripheral groove at the centre for the attachment of a supporting cord.

Multiplex Electric Arc Lamp; Richard H. Mather, Windsor, Conn..... 323,516

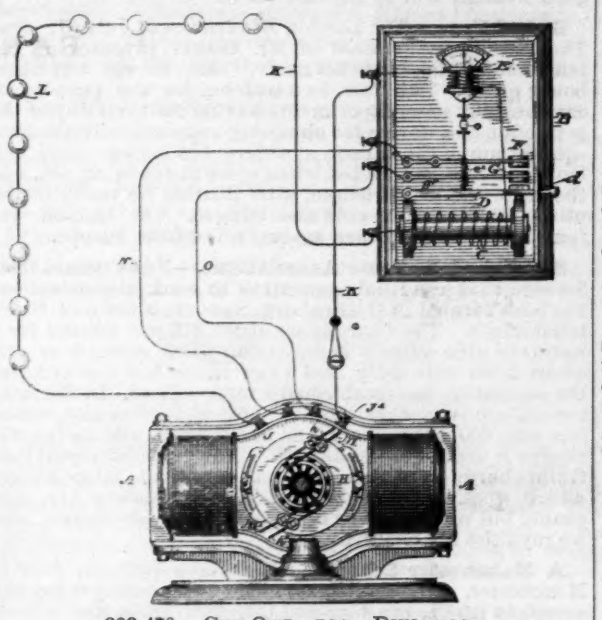
Consists of an electric arc lamp containing two or more pairs or sets of carbons whose feed mechanisms are actuated by a series consisting of a corresponding number of electro-magnets, the first magnet in said series being wound with a shunt-coil, and the second magnet in said series being wound with a shunt-coil and with a main-circuit coil supplementary thereto, in which lamp each such set of carbons constitutes a pair of contacts in a compound automatic switch regulating such lamp and coordinating the functions thereof.

Electric Low-Water Alarm for Boilers; William P. Ryman, Wilkes-Barre, Pa..... 322,600

Consists of two poles or electrodes of an electric battery with a hollow metallic float of good electrical conductivity attached to one of these poles or electrodes, and so arranged that the other pole or electrode, passing through a hole in top of float and terminating within the float, will touch at top and bottom inside the float with the fall and rise of the water in the boiler, thereby closing and opening the circuit of the electric battery, and indicating both the low and high water in boiler.

Electro-Magnetic Heating Apparatus; Moses G. Farmer, Newport, R. I..... 323,621

It is well known that certain changes of the magnetic conditions of an iron body are attended with the development of heat more or less intense, according to the rapidity and violence of the changes. The ends of the cores are

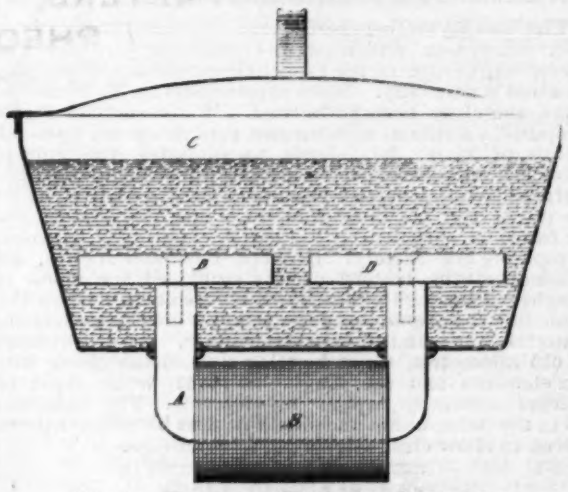


323,470. CUT-OUT FOR DYNAMOS.

projected into the vessel *C*, preferably through the bottom, and radiating plates *D* are secured to the ends of the poles. With this device but a few minutes suffice to raise a large volume of water to the boiling-point with an alternating current of considerable strength.

Chandelier for Electric Lamps; Raymond F. Barnes, Brooklyn, N. Y..... 323,625

Consists of the combination, with a chandelier containing electric wires, of an electric lamp-holder and reversible lamp and shade supported thereby, a flexible cord containing insulated conductors and connecting the chandelier and the lamp-holder, a reel within the lamp-holder, upon which the cord is wound, and electrical connections



323,621. ELECTRIC HEATING APPARATUS.

from the conductors in the cord to the conductors of the lamp.

1. **Regulator for Electric Motor**; 2. Electro-Magnetic Motor; 3. Electric Motor; Moses G. Farmer, Newport, R. I..... 323,650, 323,652, 323,653

A ring-armature of the Gramme type is formed, preferably, in a manner peculiarly adapted to expose considerable surface to the field-magnets, and these field-magnets are constructed with polar extensions nearly surrounding the ring of the armature. Like field-magnet poles are for this purpose presented to each other, and their ends are cut away, leaving an opening of approximately the shape of the cross-section of the armature-ring.

2. Relates to electro-magnetic motors containing one or more sectional helices in which a core or plunger is arranged to reciprocate. The motor may be stationary or a locomotor, and may be used for the many purposes to which steam and other engines are now applied.

Consists of stationary conducting-bars and sliding contacts for completing the circuit from the sections of the helix successively, and a rotating commutator and connections for completing the circuit alternately to the groups of the sections of the helix at opposite ends of the core alternately.

3. The device is like the present forms of steam motors, so that the motor may be substituted for those now in use without material changes in the mode of operating or running them or departure from the ordinary systems of railroading now in vogue.

Consists of one or more commutators arranged to be moved by the movement of the core or cores, and independent commutator-brushes connected with the helix sections, respectively, and arranged to make contact successively with the conducting-plates of the commutator, whereby the inductive section of the helix is kept near the end of the core as it moves.

Armature for Electro-Magnets; James F. Gilliland, Indianapolis, Ind..... 323,663

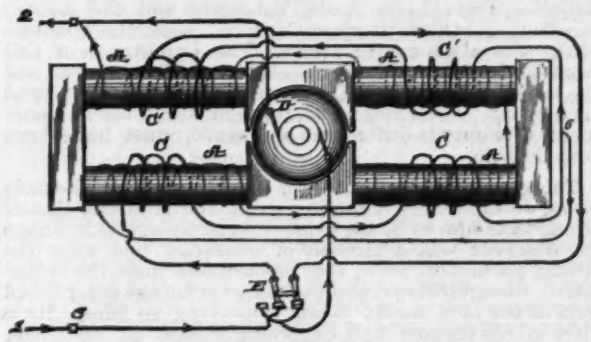
Consists in a modified form of an armature, being constructed of a straight bar provided with an enlarged portion in the centre, through which is formed a hole to receive the armature rod, which also forms the sounder-bar.

Electric Grip for Railroads; John C. Henderson, New York, N. Y..... 323,675

Consists in adjustable gripping and contact-making devices and conducting bars or rails combined within a longitudinally slotted box or tube arranged between the rails of the track.

Apparatus Employed in Electro-Chlorination of Gold Ores; Edward P. Thompson, Elizabeth, N. J., Assignor of three-fourths to Edward P. Roberts & G. H. Pierce, both of Cheyenne, Wyo.... 323,755

A series of vats of a suitable size are provided, which



323,460. ELECTRO DYNAMIC MOTOR.

can be made air-tight after the crushed ore has been introduced into them. Chlorine is liberated by an electro-chlorine generator, and is forced into these vats in succession by means of properly-connected pipes until all are filled. The excess of the gas is allowed to enter a room containing lime, forming thereby the useful by-product, bleaching powder. After as much of the chlorine has united as will do so, then through the same opening that admitted the gas-pipes, water is introduced to the treated ore in a fine spray, dissolving the chloride of gold already formed.

Lightning Arrester for Line Wires; George W. Mingle, Philadelphia, Pa., Assignor of two-thirds to E. Ward Wilkins and William T. Brown, both of same place..... 323,822

Consists of the base *A*, provided with the binding-posts *B* and *E*, shaft *C*, having pivotal bearings in horizontal arm of the post *B*, and bearing *d*, lever *D*, secured to said shaft *C*, coiled spring *b*, operating said lever *D*, insulating-post *F*, cross-piece *K* and wires *G*, said wires being secured to said cross-piece *K* and base *A*.

Secondary or Storage Battery; Eli T. and E. Eugene Starr, Philadelphia, Pa., Assignors to the Starr Electric Storage Co., Camden, N. Y.. 323,890

Each electrode is compound, *i. e.*, made of two or more electrodes, each of which is cellular, and smeared with active material.

Copies of any of the Patents mentioned in this Record, can be obtained, with full specifications and drawings, from this office on application; price 25cents each.